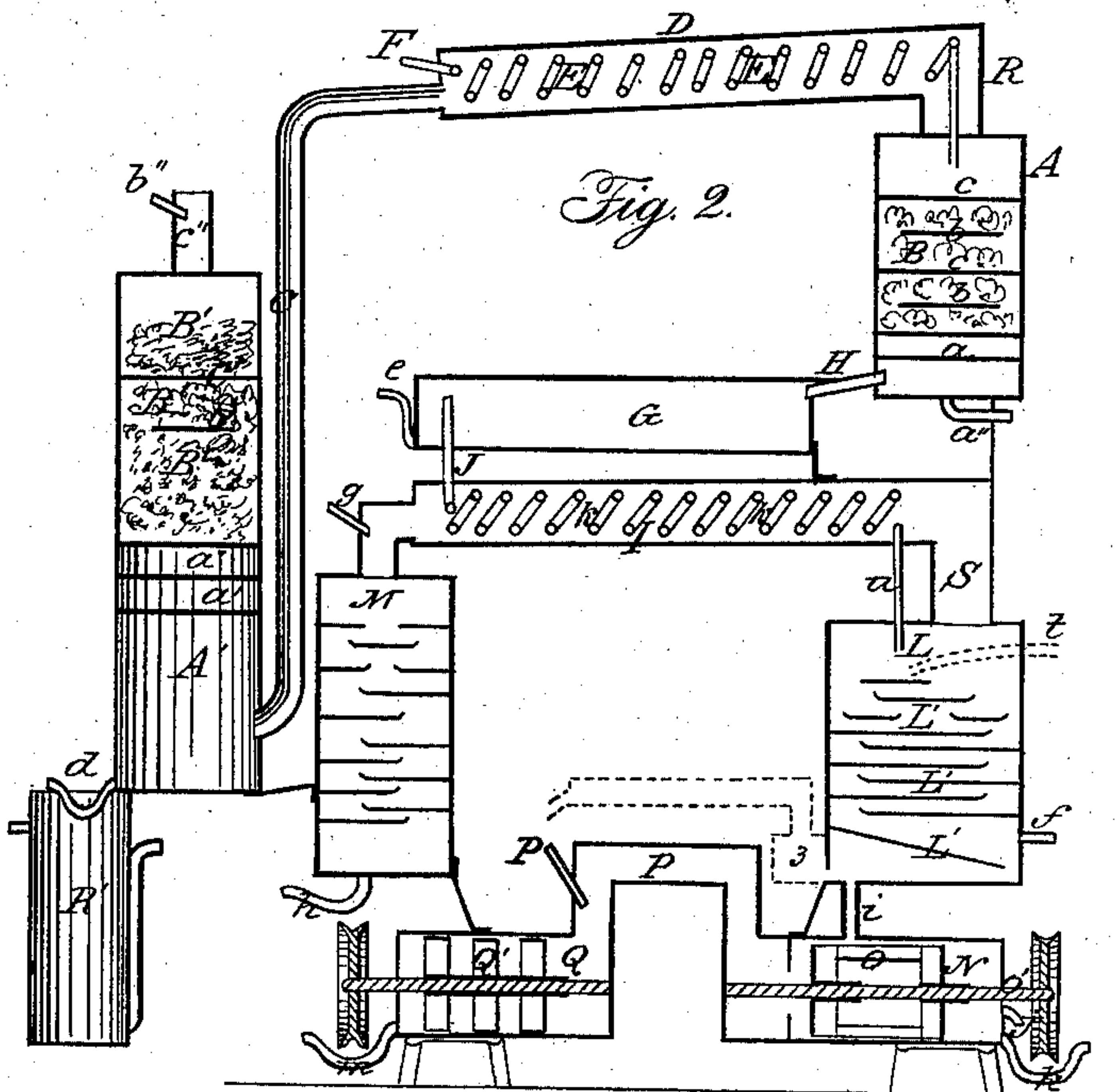
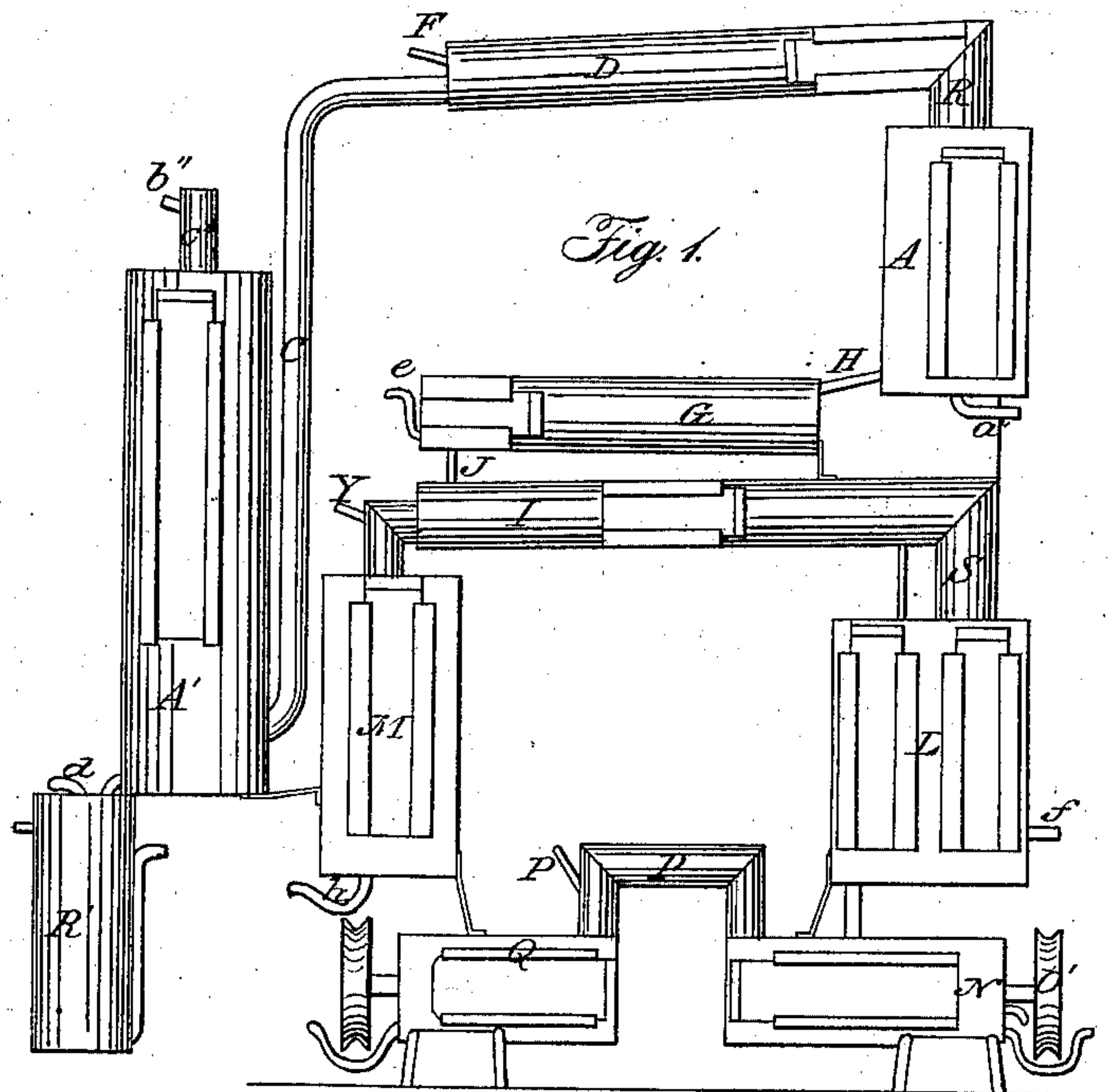


ELLIS & KATTELL.

Oil Still.

No. 63,789.

Patented Apr. 16, 1867.



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN ELLIS, OF NEW YORK, AND EDWARD C. KATTELL, OF BINGHAMTON, N. Y.

IMPROVED APPARATUS FOR DISTILLING AND REFINING PETROLEUM, &c.

Specification forming part of Letters Patent No. 63,789, dated April 16, 1867.

To all whom it may concern:

Be it known that we, JOHN ELLIS, of New York, in the county of New York and State of New York, and EDWARD C. KATTELL, of Binghamton, in the county of Broome and State aforesaid, have invented certain new and useful Improvements in Oil-Stills, &c.; and we do hereby declare that the following is a full and complete description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view of the apparatus. Fig. 2 is a vertical longitudinal section.

Like letters of reference refer to like parts in the views.

Our improvement relates to a process for distilling and refining petroleum, turpentine, &c., and for separating evenly the lighter from the heavier products of such distillation. The apparatus used for accomplishing these results consists of an arrangement of one or more retorts, with appropriate condensers, pipes, tanks, &c., arranged in the order and operated as hereafter described, or in any other order desirable; or the crude oil may be run through either one of the retorts two or three times, and thus accomplish the same results, but with less convenience and rapidity.

In Fig. 1, A is a retort, the internal arrangement of which is shown in Fig. 2. This consists of a series of division-plates, *a*, *b*, and *c*. The two lower plates are connected to the sides of the retort, and are perforated with holes. The plates *c* are also connected to the sides, and each is provided with a large central opening, whereas plates *b* are concave disks, and are not connected to the sides of the retort, but are held in their place by the metallic shavings or chips B, or with any other material of a suitable nature, filled into the spaces between the several plates, as shown in Fig. 2, the purpose of which will hereafter be shown.

A' is a condenser of a like construction, and with an internal arrangement similar to that above described, and in which *a'* are perforated plates, *b'* a disk, *c'* plate with central opening, and B' the filling of shavings. This condenser is connected with the retort A by the pipe C and condenser D. Within the lat-

ter condenser is a spiral tube, E, one end of which is seen to project from the end of the condenser at F, and the other terminates in the retort A.

G is a separating-tank, and is put in communication with the retort A by means of the pipe H. It also communicates with the condenser I by the oil-pipe J. This condenser I is also provided with a spiral pipe, K, similar in construction and arrangement to that in condenser D, and is a continuation of pipe J.

L is a retort, in which is arranged a series of plates, L', in the position and number (which may be more or less) as shown in the drawings, in which it will be seen that they are of various sizes, and alternating from side to side of the retort, so as to cause one plate to cover the open sides of the other.

M is a condenser, constructed and arranged in the same manner as the retort just described, but somewhat smaller.

N is a retort, in which is arranged a rotating agitator, O, driven by the shaft and pulley O' by any appropriate mechanical appliances. To this retort is connected, by the rectangular pipe P, a condenser, Q, in which is also arranged an agitator, Q', and which is operated in like manner as the one above referred to, and for the purpose of condensing the vapor by the aid of cold water entering from pipe P.

Having thus described the several parts of the apparatus, the practical operation of the same is as follows: For the separation of naphtha and benzine from petroleum, common steam is allowed to flow into the bottom of retort A through the induction-pipe *a''*. As it passes upward through the perforated plates, turnings, wood chips, &c., and around the concave central plates, and through the central openings of the plates *c*, arranged in the retort, thus becoming divided and largely diffused, it is met by the oil as it flows over the plates, or is retained upon their surface, and percolating through the filling of turnings or scraps, dropping from point to point and vaporizing the lighter portions, the vapor thus produced passes with the uncondensed steam up through the pipe R into the horizontal condenser D, and from which, through the pipe C, into the bottom of condenser A'. While ascending

through the perforated plates, filling, concave disks, &c., of this condenser, the steam and oil-vapor meet cold water percolating through the fillings, and running over the plates from the supply-pipe *b''*. The non-condensable gases pass up and escape from the condenser through pipe *c''*, while the water, condensed steam, and naphtha run to the bottom and escape through pipe *d* into the separating-tub *R'*.

The crude oil entering pipe *F* passes through the spiral pipe, and discharges into the retort among the turnings, disks, &c. The portion not vaporized in its descent passes out at the bottom through pipe *H*, together with the water which has resulted from more or less steam condensed in the retort, into the separating-tank *G*.

The water and earthy sediment settle to the bottom and escape through pipe *e*, while the oil rising to the top of the water flows down through pipe *J*, which becomes spiral in the horizontal condenser *I*. This spiral oil-pipe, just before it reaches the smaller section of the condenser, passes directly down through the walls of the condenser into retort *L*, and discharges its contents upon and among the several plates of the retort. The oil thus heated by the vapors in the condenser flows over the arrangement of horizontal plates and shelves, being temporarily detained by those having a concave surface or turned-up edges. As it drops from plate to plate it is dashed into spray by the ascending current of superheated steam which enters the retort through pipe *f*.

The portion of the oil vaporized by the steam passes up with the steam through the pipe *S* into the condenser *I*, and through which into the condenser *M*. While entering it is met with a stream of cold water from the pipe *g*, and flowing down among and over the horizontal plates and shelves arranged therein. The steam and vapor of oil are condensed together, and run out with the water through the pipe *h* into a separating-tub.

The non-condensable gases should be allowed a free chance to escape at the bottom of the condenser. The steam should be hot enough, or the oil should be run slow enough, in this retort to vaporize all that will condense into white oil, and that which is not vaporized in retort *L*, being already sufficiently hot, may be permitted to flow directly through pipe *i* into retort *N'*, where it is to be violently agitated in a current of superheated steam from pipe *j* until the residuum is reduced to a gravity best adapted for lubricating purposes, when it is permitted to flow from the condenser through pipe *k* into a suitable receptacle.

The steam and oil-vapor from retort *N'* pass into condenser *Q* through the rectangular pipe *P*, a stream of cold water enters the condenser from a supply-pipe, *p*, and the vapors and water are mechanically agitated together, and the products of condensation flow through the pipe *m* into a separating-tub.

By running crude oil or other fluids rapidly or slowly through the retorts, or by increasing or lessening the quantity of steam or its heat, we can vaporize and condense the various products of distillation at any desired gravity. By thus minutely dividing the crude oil or any of the products of distillation to be acted on by the hot steam, we can remove evenly, almost instantly, nearly or quite all the volatile products which a given degree of heat is capable of vaporizing, and thus avoid developing an unnecessary amount of naphtha and benzine, as is done by the slow and long-continued action of heat.

When the upper retort contains concave pans, shelves, or perforated plates with shallow concavities, these slightly-concaved surfaces become filled with hot water from condensed steam, the oil floats on the surface of this hot water and falls with it from point to point, and is dashed into a spray by the current of steam. Thus it is deodorized and volatilized equally, very little, if any, heavy oil is carried off with the naphtha, and very little or no inflammable or light naphtha is left to render the kerosene, afterward to be separated, inflammable, thus enabling the refiner to make more kerosene which will stand the fire-test than he otherwise could, for when the vapor has to be forced through several feet, or even inches, of oil before it reaches the surface, if the benzine is stopped running at 60° it will contain more or less kerosene as low or lower than 50°, and in the oil in the retort there will remain a large quantity of naphtha as light or lighter than 70°. Thus it will be seen that it is not taken off evenly, and the aim in this invention is to remedy this serious defect in the present methods of distillation. Being a process of continuous distillation, time and expense are also saved.

It is not necessary, in the case of either retort, that the steam should enter the retort at an opposite point from the oil, as represented in the drawings, for the results will be nearly or quite as satisfactory if the steam enters through the dotted pipe *t* in Fig. 2, and flows down with the oil, and both enter the chamber 3, (represented by the dotted lines,) and the condenser takes its origin from this chamber, as represented by the dotted lines above the chamber.

What we claim as our improvement, and desire to secure by Letters Patent, is—

1. The using of steam and superheated steam for the purpose of separating and removing the more volatile from the less volatile portions of petroleum, kerosene, benzine, naphtha, and turpentine, while these fluids are in a state of spray or drops, as specified.

2. The oil-pipes *E* and *K*, and condensing-tubes *D* and *I*, when constructed and arranged, in relation to each other and a retort, as and for the purposes specified.

3. The separating tank, tub, or tube, in combination with an upper and under retort, for

the purpose of separating the water and earthy impurities from the oil before the latter flows into the lower retort.

4. The using in a retort scraps of metal, wire, wire sieves, nails, turnings, or other metallic or earthen materials, or even vegetable substances, which will either form a screen or a porous mass through which oil can trickle down, so as to expose a large surface of it to the action of heat.

5. The using in a retort or retorts a series of nearly or quite horizontal plates, shallow pans or shelves, which may be concave, or with edges turned up, plain or convex, perforated with from one to numerous openings, or without any openings, over which oil can flow and drop or run from point to point, in combination with the pipe I and coil K, so as to expose a very large surface to the action of steam, and to form a large evaporating-surface.

6. The using an agitator in a circular or nearly circular retort for the purpose of throwing the oil into a spray or drops, so as to ex-

pose every drop as far as possible to the direct action of heat, and allowing the oil or fluid being distilled to flow through the retort in a steady stream, but not to accumulate in any considerable quantity in the retort, substantially as represented in the drawings.

7. The condensers A, M, and Q, containing internally plates, disks, turnings, or an agitator, into which the vapor of oil and cold water are allowed to flow for the purpose of condensing the vapor, substantially as represented in the drawings and described in the specification.

8. The blowing the inflowing oil into a state of spray by a current of steam, by allowing the steam to strike the stream of oil, substantially as is represented by the oil-pipe *u* and the dotted steam-pipe *t* in the drawings of retort L.

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