

(No Model.)

J. LAING.

DESTRUCTIVE DISTILLATION OF MINERAL OILS.

No. 488,767.

Patented Dec. 27, 1892.

FIG. 2.

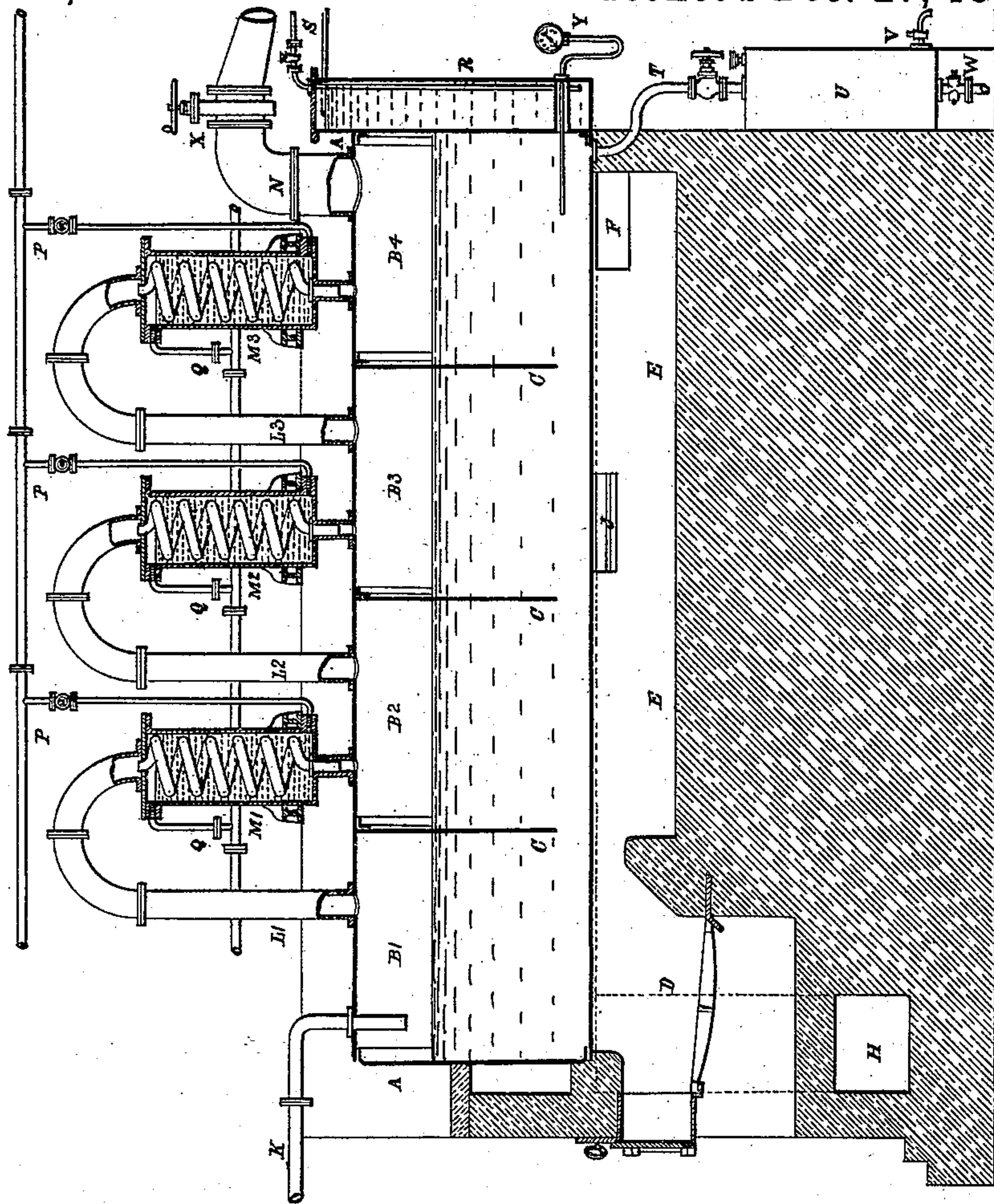
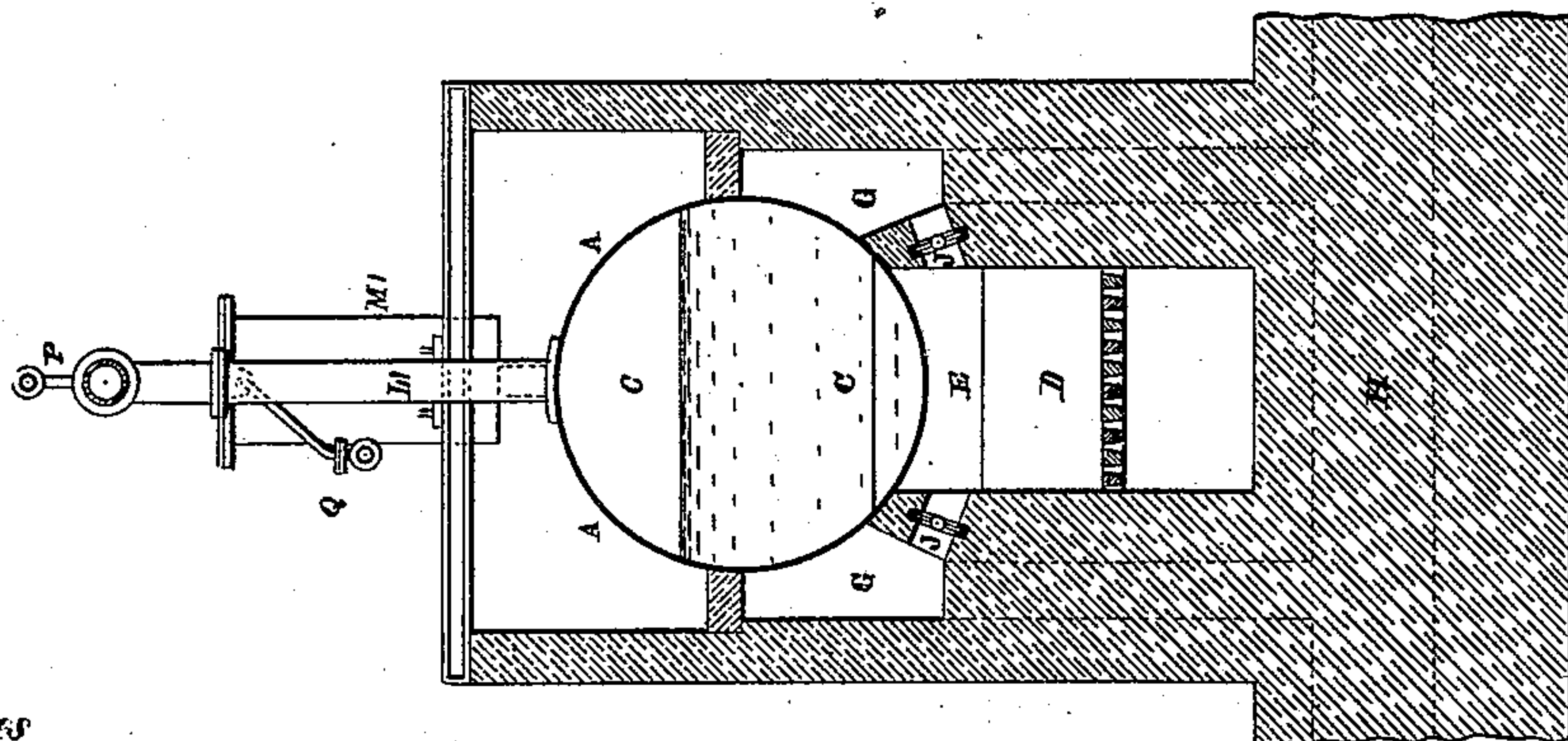


FIG. 1.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN LAING, OF EDINBURGH, SCOTLAND.

DESTRUCTIVE DISTILLATION OF MINERAL OILS.

SPECIFICATION forming part of Letters Patent No. 488,767, dated December 27, 1892.

Application filed January 8, 1891. Serial No. 377,121. (No model.)

To all whom it may concern:

Be it known that I, JOHN LAING, a subject of the Queen of Great Britain and Ireland, and a resident of Edinburgh, in the county of Mid-Lothian, Scotland, have invented certain Improvements in the Destructive Distillation of Mineral Oils, of which the following is a specification.

My said invention relates to the treatment of mineral oils by destructive distillation at or near atmospheric pressure, and has for its object the satisfactory and economical decomposition or conversion of comparatively heavy mineral oils, and the obtainment from them of lighter products. That is, oils which are lighter than the oil fed into the apparatus, being not only of less specific gravity but also more volatile.

In carrying out my invention I subject the oils to repeated distillation in a practically continuous manner, in a boiler still which may be of a horizontal cylindrical or other convenient form, and which is divided into compartments by partitions which are open at their bottoms. The vapors rising from the first compartment are condensed and led into the second compartment; and the vapors from the second and each succeeding compartment are similarly condensed and led into each further compartment.

The important feature of practically advantageous novelty in my invention consists in the repetition in one and the same process of the volatilizing or vaporizing action upon the body of oil, whereby the latter is repeatedly split up and the lighter portions completely detached or carried off. Besides this the process carries with it the advantages of rapidity of operation and uniformity of product.

In order that my said invention and the manner of performing the same may be properly understood, I hereunto append a sheet of explanatory drawings to be hereinafter referred to, and representing by way of example a modification of my improved apparatus.

Figures, 1, and 2, of the drawings are respectively a transverse vertical section and a longitudinal vertical section of the apparatus.

In the drawings the same reference letters are used to mark the same or like parts wherever they are repeated, two or more similar

parts being in some cases distinguished by numerals combined with the letters.

The distilling vessel is in the form of a horizontal cylindrical boiler, A, which is externally divided into compartments, B', B², B³, B⁴, by vertical partitions, C, which are open at the bottom to allow of free communication of the liquid oil through all the compartments, the openings or spaces beneath the partitions being, by preference, large enough to allow of access for cleaning purposes to all the compartments. The boiler, A, is set in brickwork and is heated by means of any suitable fuel in a furnace, D, at one end beneath the first compartment, B', the fire gases proceeding along a flue, E, extending under the middle of the boiler to the other end, and there communicating by side ports, F, with return flues, G, at the sides of the boiler. The return flues, G, communicate at their front ends, by descending flues, with a horizontal flue, H, which may pass under a number of boilers to a chimney. Additional ports, J, form communications between the bottom of flue, E, and the side flues, G, these ports, J, being fitted with adjustable dampers by means of which the heat acting on the after parts of the boiler may be more or less moderated if required, the fire gases tending to take the nearer route to the chimney through the ports, J, when their dampers are open. The end ports, F, may also be fitted with dampers for closing them more or less if found desirable.

The oil to be operated on is, ordinarily, supplied to the first compartment, B', by a pipe, K, and the vapors or gases evolved in that compartment pass by a pipe, L', into the worm of a condenser, M', the condensed products dropping into the second boiler compartment, B². In like manner the vapors or gases evolved in the other compartments, B², B³, pass by pipes, L², L³, into the next compartments B³, B⁴. There may be more or fewer than the four compartments shown if found desirable. From the compartment, B⁴, or the last of the series, the vapors or gases pass off by a pipe, N, to any suitable condenser or condensers.

The condensers, M, are supplied by a main and branch pipes, P, provided with stop-

cocks, with cold water, which enters at their lower ends, the heated water passing off from their upper ends by branch pipes and a main pipe, Q. As I believe it will in some cases
 5 be desirable to cool the back end of the boiler, that is, the last compartment, B⁴, I provide, there, a casing, R, with pipes, S, for supplying cold water and leading off the heated water. And at the bottom of the back end of the
 10 boiler I provide a pipe, T, for drawing off the unvolatilized residue from the oil. In some cases the residue although liquid while hot, hardens on cooling into a pitch of good quality; and the operation of the apparatus
 15 may be varied and regulated in a manner to obtain the residue or pitch in what may be considered to be the best condition. The residue pipe, T, communicates with a receiver, U, fitted with a cock, V, for drawing off a test
 20 sample, and also with a pipe for conveying the residue to a more distant receptacle, the pipes, T, and W, being both fitted with stop-cocks.

When distilling mineral oil according to
 25 my improved system no steam unless superheated is on any account to be let into or used in the still boiler as it would prevent the efficient breaking up or decomposition of the oil. If the still is being fed continuously, or
 30 indeed in any case, great care must be taken to have the oil "dry," that is, quite free from water. In each succeeding compartment of the still more and more of the lighter oil is obtained; and the heat applied to the still
 35 should be regulated so that what acts on the last compartment, B⁴, may be just sufficient to volatilize the lighter oil and thus separate it from the heavier remaining liquid. I apply a stricture valve, X, to the final delivery pipe
 40 or swan-neck, N, which conveys the vaporized oil from the last compartment to the condensers, for the purpose of by its means regulating the rate of delivery by reducing or increasing the opening through the swan-neck.
 45 In order to assist the regulating of the heat applied to the last compartment, B⁴, I have a

pyrometer, Y, applied to that compartment with its inner end immersed in the liquid oil; and when the proper temperature for that compartment has been determined by trials
 50 in the case of any particular kind of mineral oil, the heat can thereafter be suitably regulated by aid of the pyrometer.

Pipes may be provided for supplying fresh or cold oil to any of the compartments as well
 55 as to the first, such arrangement affording additional means for regulating the effective temperatures within the apparatus. Suitable pressure gages and thermometers or pyrometers may be fitted to the apparatus wherever
 60 it may be thought desirable. The actual internal pressure may be varied to a small extent by means of the stricture valve, X, in the end outlet or swan-neck, N, and by suitably regulating the action of the condensers or otherwise, it not being essential to my process to
 65 restrict the internal pressure exactly to atmospheric pressure as it may exceed that pressure to a small extent, say not more than ten pounds on the square inch, or it may be
 70 less without injurious results.

What I claim as my invention is:—

An improved process for treating heavy mineral oils to obtain lighter oils, the said process
 75 consisting in distilling the oil from a series of compartments or vessels, the liquid in all of which is in communication, and passing the volatilized matters through condensers from each compartment or vessel to the next in
 80 order and from the last to ordinary condensers, the condensed products from each condenser but the last being led to the body of oil under treatment in the successive compartments, substantially as hereinbefore described.

In testimony whereof I have signed my
 85 name to this specification in the presence of two subscribing witnesses.

JOHN LAING.

Witnesses:

EDMUND HUNT,
 DAVID FERGUSON.