

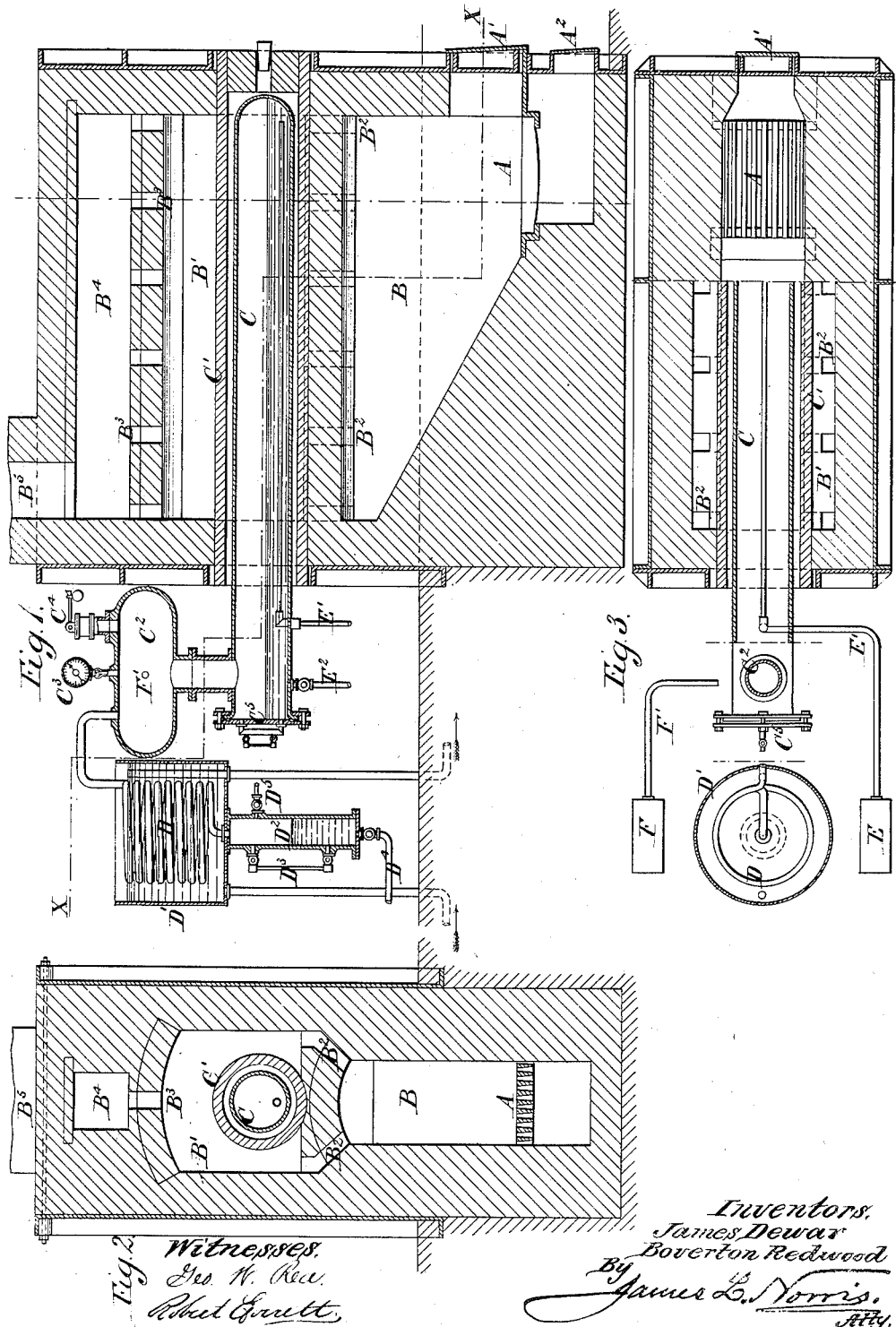
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J. DEWAR & B. REDWOOD.

# PROCESS OF DISTILLING MINERAL OILS AND LIKE PRODUCTS.

No. 419,931.

Patented Jan. 21, 1890.



# UNITED STATES PATENT OFFICE.

JAMES DEWAR, OF CAMBRIDGE, COUNTY OF CAMBRIDGE, AND BOVERTON REDWOOD, OF FINCHLEY, COUNTY OF MIDDLESEX, ENGLAND.

## PROCESS OF DISTILLING MINERAL OILS AND LIKE PRODUCTS.

SPECIFICATION forming part of Letters Patent No. 419,931, dated January 21, 1890.

Application filed September 3, 1889. Serial No. 322,856. (No specimens.) Patented in England June 24, 1889, No. 10,277; in France August 30, 1889, No. 200,495; in Belgium August 30, 1889, No. 87,570; in Switzerland August 30, 1889, No. 1,339, and in Italy October 1, 1889, LI, 233.

### *To all whom it may concern:*

Be it known that we, JAMES DEWAR, professor of chemistry, and BOVERTON REDWOOD, analytical chemist, citizens of England, residing, respectively, at No. 1 Seroop Terrace, Cambridge, in the county of Cambridge, and at Ballard's Lane, Finchley, in the county of Middlesex, England, have invented new and useful Improvements in the Distillation of Mineral Oils and Like Products, (for which we have obtained Letters Patent in France, dated August 30, 1889, No. 200,495; Belgium, dated August 30, 1889, No. 87,570; Switzerland, dated August 30, 1889, No. 1,339; Italy, dated October 1, 1889, Vol. LI, No. 233, and Great Britain by an application for patent, which patent when granted will bear date June 24, 1889, No. 10,277,) of which the following is a specification.

In distilling mineral oils—such as natural petroleum or similar oil made from shale, coal, or other bituminous substances—in order to separate the lighter oils, suitable for lamps and other purposes, from the heavier oils, there is frequently a very large residue of heavy oil. Attempts have been made to obtain lighter oils from such residues or from heavy natural petroleums by causing the vapor generated in the still-boiler to pass a heavily-loaded valve, so that the vaporization takes place under considerable pressure. It has also been proposed to arrange the still-boiler with its upper part cooled, so that the best volatile portions of the vapor may become more or less condensed and fall back into the hot liquid below, this mode of operating being commonly termed "cracking." Both these methods are objectionable, the former on account of the irregularity of the distillation and the latter on account of the waste of heat in conducting the cracking process and the slowness and insufficiency of the results.

Our invention relates to a method of conducting the distillation by suitable apparatus in such a manner that we get the benefit of regular vaporization and condensation under high pressure, and that we may at the

same time get such advantage as can be obtained from cracking. For this purpose we arrange a suitable boiler or retort and a condenser in free communication with one another without interposing any valve between them; but we provide a regulated outlet for condensed liquid from the condenser. We charge and keep charged the space in the boiler or retort and condenser that is not occupied by liquid with gas under considerable pressure, it may be with air or it may be with carbonic-acid gas or other gas that cannot act chemically on the matter treated. The distillation and condensation being thus conducted under considerable pressure, which can be regulated at will, we obtain from the heavy residue a quantity of more or less light oil suitable for illuminating and other purposes, which cannot be obtained by distillation under atmospheric pressure. We may also arrange the still-head or upper part of the boiler or retort so as to operate according to the cracking method above referred to, the cracking in this case taking place under high pressure instead of being carried on under atmospheric pressure.

The apparatus for effecting distillation in the manner described may be arranged in various ways. The accompanying drawings show one form of apparatus for this purpose, which is the subject-matter of a patent application of even date herewith, Serial No. 322,857.

Figure 1 is a longitudinal and Fig. 2 is a transverse section. Fig. 3 is a sectional plan on the line X X of Fig. 1.

A is a fire-place, with fire-door A' and ash-pit door A<sup>2</sup>, suited for regulating admission of air as required.

Instead of a fire-place with grate for burning solid fuel, any known burners for liquid or gaseous fuel may be employed.

Above the combustion-chamber B is placed a metal retort C, which is inclosed within a refractory casing C' to protect the metal from excessive local heating. The incased retort is situated in a heating-chamber B', into which the hot products of combustion ascend

by side ports B<sup>2</sup> and from which they pass by central ports B<sup>3</sup> into a flue B<sup>4</sup>, communicating with a chimney B<sup>5</sup>. The front part of the retort C communicates freely with a still-head C<sup>2</sup>, provided with a pressure-gage C<sup>3</sup> and safety-valve C<sup>4</sup>. The exposed end of the retort C is closed by a readily-removable cover C<sup>5</sup>, provided with a glass gage to show the level of the liquid in the retort.

D is a pipe-coil situated in a tank D', in which circulation of water is maintained. The upper end of the coil D communicates by a pipe with the still-head C<sup>2</sup> and its lower end opens into a hollow column D<sup>2</sup>, which is provided with a glass gage D<sup>3</sup> and has at the bottom an outlet-pipe D<sup>4</sup>, furnished with a stop-cock or valve.

E is a pump for forcing the oil to be treated by a pipe E' into the retort C, this pipe preferably extending nearly to the farther end of the retort. By another pipe E<sup>2</sup>, furnished with a cock or valve, the contents of the retort can be drawn off, or this pipe may communicate with a second retort, which in like manner may be connected with a third, so as to form a series of any required number.

F is an air-compressing pump, by which air or suitable gas is forced by a pipe F' into the still-head C<sup>2</sup>, or it might be into any other part of the apparatus which is in communication with the still-head. The retort C being partly charged with oil by the pump E, and the spaces in the retort C in the still-head C<sup>2</sup> and in the condensing-coil D and column D<sup>2</sup> being charged with air or gas to the desired pressure, the retort is heated, vaporizing the oil under pressure. The oil-vapor is condensed in passing through the coil D and the liquid distillate collects in the column D<sup>2</sup>, and is drawn off either continuously or intermittently into suitable receptacles, in which such gas as may be dissolved in the liquid is liberated and can be collected.

By a pipe and cock or a suitably-loaded

safety-valve D<sup>5</sup> gas may be withdrawn from the space above the liquid in the column D<sup>2</sup>.

Although we have shown one retort and condenser, there may be several sets of these in communication with the oil and gas pumps or with each other, suitable cocks or valves being provided in the communicating pipes, so that the several retorts may be worked simultaneously or in rotation. From time to time the cover C<sup>5</sup> of the retort may be removed to clear out residue. During the distillation such of the vapor as may be condensed in the still-head C<sup>2</sup>, or such liquid as may prime up into the still-head, flows back into the body of liquid in the retort. By regulating the heat and pressure to which the retort is subjected the character of the distillate may be varied, and thus oils more or less light can be obtained to suit various uses. Also, the proportions of the parts may be varied, and, if necessary, means of cooling may be applied to the still-head C<sup>2</sup>.

Having thus described the nature of our invention and the manner of carrying the same into effect, we claim—

The herein-described method of distilling mineral oils and like products, which consists in both vaporizing them and condensing the generated vapor under a regulated pressure of air or gas, substantially as specified.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 13th day of August, A. D. 1889.

JAMES DEWAR.

BOVERTON REDWOOD.

Witnesses:

OLIVER IMRAY,

*Patent Agent, 28 Southampton Buildings, London, W. C.*

JNO. P. M. MILLARD,

*Clerk to Messrs. Abel & Imray, Consulting Engineers and Patent Agents, 28 Southampton Buildings, London, W. C.*