No. 646,639. Patented Apr. 3, 1900.

# J. A. DUBBS.

## DISTILLING PETROLEUM.

(Application filed Nov. 2, 1899.)

(No Model.)

FIG. 1.

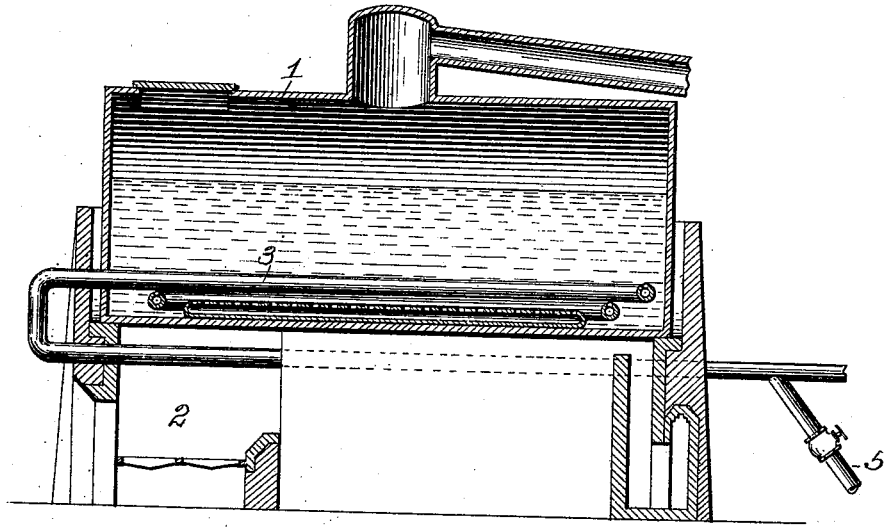
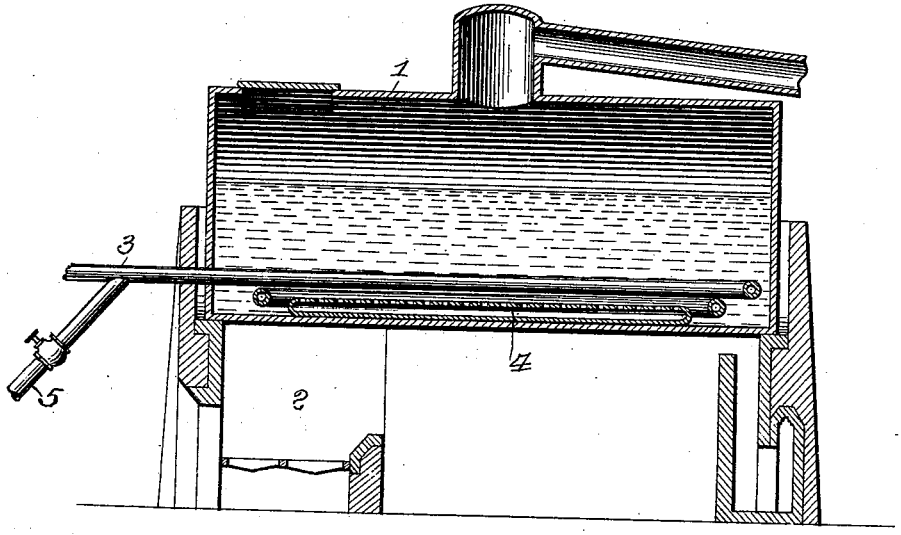



FIG. 2.

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# UNITED STATES PATENT OFFICE.

JESSE A. DUBBS, OF PITTSBURG, PENNSYLVANIA.

## DISTILLING PETROLEUM.

SPECIFICATION forming part of Letters Patent No. 646,639, dated April 3, 1900.

Application filed November 2, 1899. Serial No. 735,559. (No specimens.)

*To all whom it may concern:*

Be it known that I, JESSE A. DUBBS, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Distilling Petroleum, of which improvements the following is a specification.

The invention described herein relates to certain improvements in the distillation of oils, such as petroleum, the improvements having for their objects a large increase in the distillates produced and a refinement of the residuum to a merchantable form or condition.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of a form of apparatus for the practice of my invention, and Fig. 2 is a similar view of a modified form of such apparatus.

In the practice of my invention the still 1 may be of any suitable form or construction known in the art and having a suitable fire-chamber 2 for heating the still. A pipe 3, leading from any suitable source of air under pressure, is so arranged in coils or otherwise in the still that the air passing through such pipe will be heated to or approximately to the temperature of the contained oil before reaching the perforated discharge portion 4 of the pipe, which is preferably arranged along the bottom of the still, as shown in Fig. 1. If preferred, the air-pipe 3 may be arranged in such relation to the fire-chamber 2 that the air will be heated before entering the still, as shown in Fig. 1.

The oil to be treated is charged into the still, which is then heated in the usual manner to the temperature usual in distilling oils. As a spontaneously-explosive compound is formed by a mixture of air and the gases from the oils when the latter form between nine per cent. and twenty per cent. of the total volume of such mixture, care should be taken when using external heat to heat the oil sufficently to effect a considerable evolution of gas before the air is admitted. The safe point is evidenced by condensed gases escaping from the cendenser. After the oil has been heated sufficiently to insure the presence of a safe percentage of gas in the still air is forced through the pipe 3 into and through the oil, thereby so agitating the oil as to facilitate the disengagement of the evolved gases from the oil. In addition to this agitating function the air, which has been previously heated and dried, will take up considerable quantities of vapor and act as a mechanical conveyer, carrying such vapors into the condensing-coil, where such mechanically-mixed vapor will be condensed and freed from the air.

By the use of air a large increase of desirable distillates is obtained from the oil and the character of such distillates is greatly improved. While the cause of such increase in production of the lighter oils and the improved quality of the same cannot be positively stated, it is believed that they result from the splitting of the heavier hydrocarbons by the combination of the oxygen of the air with some of the hydrogen.

It is characteristic of the use of air in distillation, especially when applied to the treatment of California petroleum, that the residuum after evolution of the desirable distillates is a true asphaltum and can be used as such without further treatment, whereas the residuums resulting from the ordinary methods of distillation are petroleum tar or pitch.

It is generally believed that in the distillation of petroleum the gases evolved in passing through the oil become covered or carry with them some of the heavier hydrocarbons in liquid form and that such mechanical transfer of the liquid hydrocarbon is the cause of the low specific gravity of the distillate. While not stating such to be the fact, it is my belief that the air in some manner prevents this mechanical transference of liquid hydrocarbon from the still, so that the charge therein becomes heavier as the distillation progresses, resulting in the production of asphalt as a residue and at the same time producing distillates of a much lighter specific gravity than would otherwise result.

In order to prevent the formation of explosive mixtures of air and gas at the end of the vaporizing operation, the vaporization should be so conducted that the volume of oil-vapor generated should always exceed twenty per cent. of the volume of air and gas at any time in the still. This can be effected by maintaining vaporization by the continued application of a vaporizing heat until the air is cut

off. The time at which the air should be cut off is shown by a reduction of distillate escaping from the condenser. In practice the air is gradually reduced as vaporization lessens in order that the beneficial action of the air may be had as long as possible.

It has been found in practice that after the application of heat to the still has ceased there will be a condensation of the vapors given off on the cooling walls of the still and that this condensed vapor dropping back into the residuum in the still has an injurious effect thereon. This injurious action can be avoided by forcing steam through the still at the end of the operation. Hence it is preferred to introduce steam as the air is reduced, the volume of steam being increased as the air is reduced. The steam can be conveniently introduced by connecting a steam-supply pipe 5 to the air-supply pipe 5 at a point outside of the still.

The amount of air injected is controlled by the quantity of distillate escaping from the condenser. Generally stated, a cubic foot of distillate equals about ten thousand cubic feet of gas. Hence by determining the quantity of distillate running from the condenser in given time—say one minute—the volume of air to be forced into the still during the same period can be ascertained—as, for example, if the distillate is escaping from the condenser at the rate of one cubic foot a minute, thereby indicating the generation of ten thousand cubic feet of vapor per minute, the attendant will so regulate the air-injector that about forty thousand cubic feet of air per minute will be forced into the still. After some few trials the attendant by watching the stream of distillate running from the condenser can determine with sufficient accuracy the quantity escaping in a given time and will regulate the air-injector accordingly, the capacity of such injector being known.

While it is preferred to use external heat in connection with the air, the latter may be heated sufficiently high to affect the required distillation without applying external heat to the still. In order to carry on the distillation without the aid of external heat, the air before reaching the interior of the still is passed through a superheating-coil and there heated up to the required temperature and then forced into the still.

I claim herein as my invention—

As an improvement in the art of vaporizing oil, the method herein described which consists in producing an initial vaporization of the oil by heating the same, then forcing air through the oil in such regulated quantities that the volume of air thus introduced will not at any time be greater than four times the volume of vapor given off by the oil and maintaining the oil at a vaporizing temperature during the introduction of air, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JESSE A. DUBBS.

Witnesses:
DARWIN S. WOLCOTT,
F. E. GAITHER.