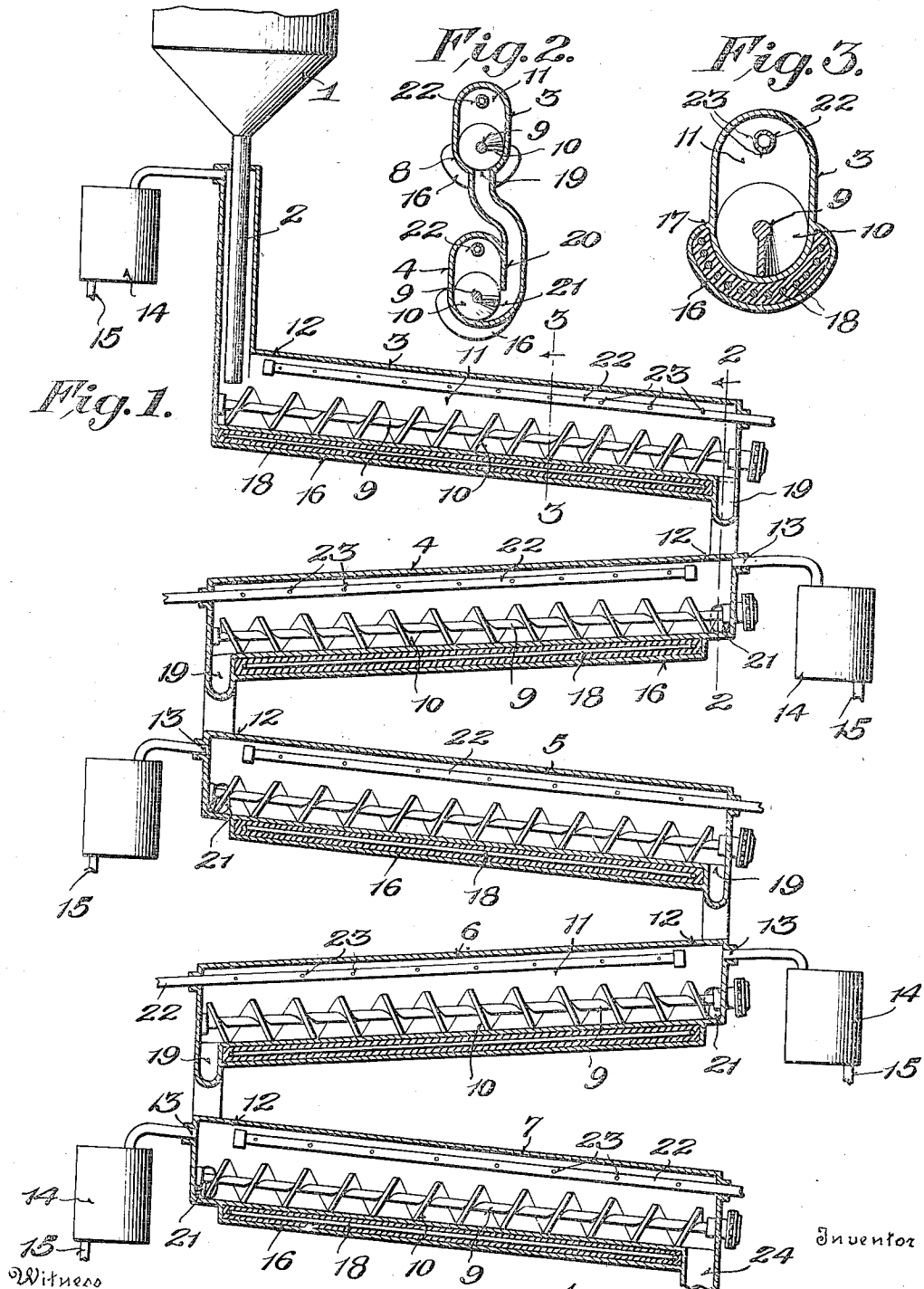


F. G. SHREVES.
OBTAINING OIL FROM SHALE.
APPLICATION FILED FEB. 25, 1918.

1,297,022.

Patented Mar. 11, 1919.



Witness

Inventor

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UNITED STATES PATENT OFFICE.

FREDERICK G. SHREVES, OF DENVER, COLORADO.

OBTAINING OIL FROM SHALE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, FREDERICK G. SHREVES, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Obtaining Oil from Shale; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

The object of this invention is to improve the apparatus for obtaining oil from shale so that greater quantities of the shale may be handled and the various constituent hydrocarbons obtained from the rock separately instead of obtaining all at one time, which requires later separation into the various commercial grades of oil. A further object of the invention is to greatly cheapen the handling of the material while obtaining a maximum output of oil.

In the drawings,—

Figure 1 is a diagrammatic view of my apparatus.

Fig. 2 is a cross section on the line 2—2 of Fig. 1, showing the vapor trap between the various troughs.

Fig. 3 is a cross section on line 3—3 of Fig. 1, particularly illustrating the method of heating the troughs.

The shale which is preferably finely ground or pulverized in order to render the obtaining of the oil from the rock less difficult, is placed in the bin 1 from which it descends to the pipe 2 into the first trough 3 of the apparatus. There are a number of these troughs 3—7, depending upon the number of divisions of the oil that it is desired to make. These troughs are all exactly similar so that the description of one will suffice for all. In the trough 3 which is preferably egg-shaped or oval in shape with the lower portion 8 concentric with the axle 9 of the worm conveyer 10 which slowly conveys the pulverized shale from one end of the trough to the other. The upper part of the trough forms a vapor dome 11, permitting the gaseous hydrocarbons to ascend in the trough in opposite direction to that in which the shale is being forced partly by gravity and partly by the action of the worm conveyer. At the upper portion 12 of each of the troughs is an outlet 13 to convey the vaporized oil to a condenser 14 of the usual type in which the oil is reduced to a liquid state, and with-

drawn through pipe 15. In all except the first trough the vaporized oil is passed from the highest point of the trough direct to the condenser, but in the first trough I find it advantageous to pass the vapor around the pipe 2 leading the crushed shale to the first or upper trough in order to gradually submit this powdered shale to heat. The various troughs are heated by electric heating means 16 which surround the trough to a point 17 about on a level with the top of the conveyer in order to provide maximum heat directly upon the powdered shale. It will be understood by those familiar with the art that means are also provided for heating the shale by means of gas as well as by the electric means shown. The gas means are of the usual type and are intended to utilize such of the vapors driven off from the shale as cannot be condensed. By using electric resistance elements 18 for heating these troughs I am able to regulate the heat on any trough independently of the temperature in the other troughs or chambers and at a maximum rapidity and in this way can control exactly the constituent of the oil which I take out in any step or trough, these various hydrocarbons differing from each other merely in their boiling point, it being customary at the present time to consider an oil containing various hydrocarbons having boiling points between certain definite figures as "gasolene", irrespective of its exact chemical composition and then taking from that highest boiling point onward to another arbitrary point to denote kerosene, these terms unfortunately varying with the particular localities. By virtue of the rapidity with which I can change the heat to which the shale is subjected I can closely limit the gas being produced by any one step to such chemical composition as I may desire.

Referring now to Fig. 2, the pipe conveying the shale from one trough to another leads from the lower portion 19 of the upper trough around the side 20 of the lower trough and discharges at a point 21 to the side of the worm conveyer, the purpose of this construction being to provide a vapor trap so that the vaporized products from one step or trough will not pass to the trough above.

As is usual in devices of this nature I provide for passing steam through the vapor chambers of the various troughs. The steam is provided by any preferred generator and

passes through the pipes 22 as shown in the drawings, such pipes being provided with small orifices 23 equispaced along their length. Preferably these steam pipes are 5 concentric with the upper arc of the trough, though not necessarily so. The lower trough 7 drops the refuse from the system, as at 24.

What is claimed is:

1. In a retort, the combination with a plu- 10 rality of chambers, a conveyer in each chamber, a vapor dome above each conveyer, a condenser connected with each vapor dome, heating means individual to each chamber, and means connecting certain of said cham- 15 bers permitting passage of matter from an upper to a lower chamber but preventing passage of matter from a lower to an upper chamber.

2. A chamber for a multi-chambered shale 20 retort, consisting of an elongated tube, a

worm for conveying solid material in said tube, a vapor dome above the worm conveyer, means partially surrounding said conveyer for heating the solid material, and means for forcing the vapor generated in the 25 chamber in a direction opposite to that in which the solid material is moved.

3. In a retort, a chamber consisting of an elongated vapor-tight trough having its exit end at a point lower than its entrance end, 30 means for heating the trough and generating gas from the solid material in said trough, means for driving the gas toward the entrance end, a tube leading from the entrance end, and a supply pipe for solid 35 material in said tube, whereby the solid material delivered to the trough will be heated by the gases passing from the trough.

FREDERICK G. SHREVES.