March 13, 1934. E. B. McCONNELL 1,950,900

PROCESS AND MEANS FOR PRODUCING ASPHALT

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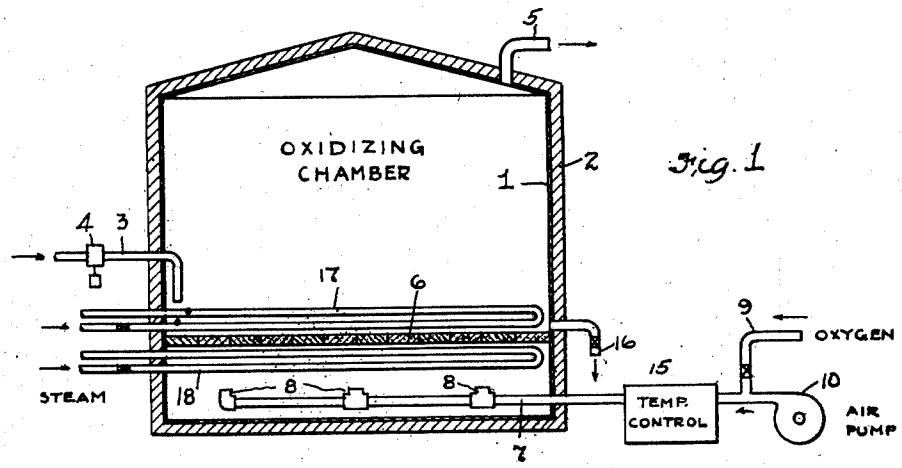


Fig. 1

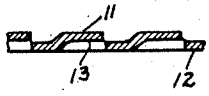


Fig. 2

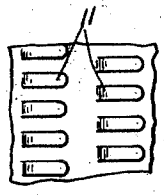


Fig. 3

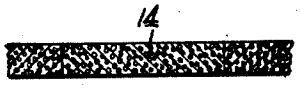


Fig. 4

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PROCESS AND MEANS FOR PRODUCING ASPHALT

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11 Claims. (Cl. 196—74)

In the customary preparation of asphalt by heating petroleum residuum and blowing air therethrough, among other difficulties encountered is the baking of the material on the still surfaces. In accordance with the present invention, the difficulties and draw-backs concomitant with furnace-heating in asphalt-making may be eliminated, and an easily controllable procedure may be had, with a high capacity through-put. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing:—

Fig. 1 is a vertical sectional semi-diagrammatic view showing apparatus contemplated in the invention; Figs. 2 and 3 are fragmentary section and plan views of details; and Fig. 4 is a similar sectional detail of another form.

Referring more particularly to the drawing, there is shown a container or tank 1 having a covering or lagging of heat-insulating material 2, and provided with an inlet connection 3 for petroleum residuum, as forwarded from any suitable source, for instance from a reducing still or pipe still through a pump 4. A vent outlet 5 at the upper portion of the container or tank may lead to the atmosphere, through a condenser if desired. In the lower portion of the tank, a gas-pervious diaphragm 6 is provided and conveniently this may take the form of a false-floor or partition. Beneath the diaphragm 6 is an inlet 7 for oxygen-supplying gas. Preferably, this may have several openings 8, to provide distribution, particularly if the tank be on a large scale. The oxygen pipe 7 may connect with a source of supply, which may be a connection 9 to a source of compressed-oxygen if desired, or to an air-compressor 10.

The detail construction of the diaphragm 6 may vary somewhat, in accordance with circumstances, and may comprise plural-mesh metal, or stamped metal in which openings are provided on a very fine scale, for instance such as off-set punchings 11 (Figs. 2 and 3), in plate 12, the offsets being scored and spaced just sufficiently to provide fine pass-ways 13 for gas, without opening up free channels for the asphalt material. Preferably yet, the gas-pervious diaphragm may be in the form of porous materials such as fabricated aluminum oxide plates, porous porcelain or other ceramic material 14 (Fig. 4), in which a porous structure may be had to desired extent in accordance with sizes of grain material initially entering into the make-up of the plates or tiles.

For the production of asphalt, hot petroleum residuum, for instance as coming from a still, is introduced into the container 1 through the inlet 3. The temperature of the material may range for example, from 400° to 700° F. Oxygen is also supplied from the source 9, or air from the pump 10, and passing through the pervious diaphragm 6 is thereby broken up into very finely divided state and thus fed into the body of residuum thereover. An advantage of the employment of oxygen is that all of the gas passed through the diaphragm is actively available, and no dilute inert gas, as in the case of the nitrogen of the air, has to be handled. On the other hand, by employment of air, a cheap and readily available source of oxygen is had, even though requiring a greater through-put on account of the diluent nitrogen contained. The gas as supplied to the pipe 7 may be subjected further to a temperature control in the conditioner 15. For instance, the gas may be heated there, and its temperature gauged to maintain effective action in the tank even with relatively low temperature petroleum material. On the other hand, if the temperature of the latter is already unnecessarily high, the gas may be cooled in the conditioner 15. In such manner, the operation in the tank may be controlled quite precisely in accordance with any particular temperature requirements. The waste gases escape through the outlet 5, and may be passed through a condenser system if desired, or wash-towers, to catch any possible constituents which are not to be discharged directly to the atmosphere. The final asphalt product may be drawn off by the outlet 16.

In cases of shut-down, etc., and a freezing or solidification of the asphalt material on the diaphragm surfaces, heat may be introduced for melting such material and freeing the surfaces of obstruction, by means of a suitable heating element, for instance a steam coil 17. If desired, a similar coil 18 may be provided also below the diaphragm.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the

means stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A method of making asphalt, which comprises passing oxygen in capillarily-divided state into a body of hot petroleum residuum.

2. A method of making asphalt, which comprises separating a body of hot petroleum residuum from a gaseous oxygen supply by a gas-pervious diaphragm, and forcing the gaseous oxygen in capillarily-divided form into the petroleum residuum.

3. A method of making asphalt, which comprises supplying a body of hot petroleum residuum at one side of a porous diaphragm, and supplying air at a greater pressure at the other side to capillarily divide and permeate into the petroleum residuum.

4. A method of making asphalt, which comprises supplying a body of hot petroleum residuum against a gas-pervious diaphragm, supplying air at the other side, and forcing the air through to permeate the petroleum residuum in capillary division, while guarding the residuum against heat-loss exteriorly.

5. A method of making asphalt, which comprises separating a body of hot petroleum residuum from a pressure air-supply by a wall having devious fine passages, and forcing air through in minute division into the petroleum residuum.

6. A method of making asphalt, which comprises separating a body of hot petroleum residuum from a pressure air-supply by a wall having devious fine passages, and forcing air through in minute division into the petroleum residuum, while guarding the residuum against heat loss exteriorly.

7. Apparatus for making asphalt, which comprises a container, means for guarding said container against heat-loss exteriorly, means for supplying petroleum residuum thereto, a gas-pervious diaphragm partitioning said container and having capillary passages, and means for passing gaseous oxygen through said diaphragm into the container.

8. Apparatus for making asphalt, which comprises a container, means for supplying petroleum residuum thereto, a gas-pervious diaphragm in the lower portion of said container, means for introducing gaseous oxygen through said diaphragm into the container, and indirect heat exchange means for heating the diaphragm.

9. Apparatus for making asphalt, which comprises a container, means for supplying petroleum residuum thereto, means for guarding said container against heat-loss exteriorly, a porous ceramic diaphragm in the lower portion of said container, and means for supplying gaseous oxygen through said diaphragm.

10. Apparatus for making asphalt, which comprises a container, means for supplying petroleum residuum thereto, a diaphragm of porous aluminum oxide blocks in the lower portion of said container, indirect heat exchange means for heating the diaphragm, and means for supplying gaseous oxygen through said diaphragm.

11. Apparatus for making asphalt, which comprises a container, means for supplying petroleum residuum thereto, means for guarding said container against heat loss exteriorly, a porous ceramic diaphragm in the lower portion of said container, indirect heat exchange means for heating the diaphragm, and means for supplying gaseous oxygen through said diaphragm.

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