SINCLAIR REFINING COMPANY

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Reel 224
Frame 10428-30

1855 S-119

Process which is suitable for the carbonization of solid shale rock.

This invention deals with the carbonization of solid shale rock.

Previously known methods required, on the one hand, the introduction of additional heat and were unsuitable for continuous operation on the other hand.

This invention provides for the sinking of drill holes, e.g. 15 m apart, between two galleries, at an angle, preferentially at one of 90°. The distance to be chosen for the drill holes depends upon the air and gas permeability of the dried shale blocks. For example, the individual drill holes may be 60 cm apart. The drill holes are connected by means of individual pipe lines in such a manner that every drill holes can be separately connected and disconnected, so that false air may not penetrate. The connections are arranged in such a manner that air, combustion and carbonization gases can be passed separately through the drill hole (#-10 in the diagram are drill holes). The connecting pipes of the pipe line and their packing in the drill holes reach so far down that we are sure that no false air can reach the drill holes. Thereby at the same time, safety pillars for the galleries are left standing.

It is a well known fact that one half of the residual heat contained in the shale is sufficient for carbonization. For this reason the drill holes which are no more necessary are sealed with a suitable medium, e.g. brick work, after removing the connecting pipes. The carbonisation process, depicted in the diagram, advances from right to left. Drill holes (1) and (2) are already disconnected from the pipeline and sealed. Drill holes 3 and 4 lie in the combustion zone. They are connected with the pipelines only on one side. Air can enter the holes on the disconnected side. The air is sucked through the incandescent, already carbonized shale. The oxygen is converted to CO_2, the air becoming hot. By means of suitable connections the hot heating gases are passed through holes (7) and (8). The hot gases dry the shale and reach the open air through the blowers (1). Drill holes (5) and (6) are isolated from the connecting line by suitable media. Through these drill holes the carbonization gases are sucked off by means of blowers (2). The connection of drill hole (9) is ready. Drill hole (10) is not yet connected with the pipelines.

The operation is controlled according to the following principles.

It is a well-known fact that the carbonization process starts at 150°C. At 600° it is practically terminated. The heating gases which come from the combustion zone are cooled to a temperature of less than 150°C. by means of suitable devices. At this temperature they are introduced into the drying zone (tubes 7 and 8). When the gases on the outlet-side of tubes (7) and (8) reach a temperature of 100 to 150°, the drying process is terminated. The next drill hole (#9 in the diagram) is then connected. From the drill holes (5) and (6) the carbonization gases will be sucked off until they will reach a temperature of approximately 600°. Then, that drill hole which has reached this temperature, is disconnected from blower (2), disconnected from the pipeline and connected with blower (1). This method makes it possible to carbonize beds of great length.

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The novelty in this invention is:

(1) that no extraneous heat is required for the carbonization of the shale.

(2) that the entire carbonization process is subdivided into three zones which can be controlled at will.

(a) the drying zone
(b) the carbonization zone
(c) the combustion zone

(3) the carbonization zone lies between the combustion and drying zone which is filled with inert gases (heating gases) so that we are sure that oils will not be burnt.

(4) the connection with the pipelines are arranged in such a manner that false air cannot penetrate in the combustion zone and that thus safety posts are evolving at the same time.

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