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E. G. SINCLAIR

METHOD OF MINING OIL AND THE LIKE

Filed Oct. 16, 1926

Fig. 1.

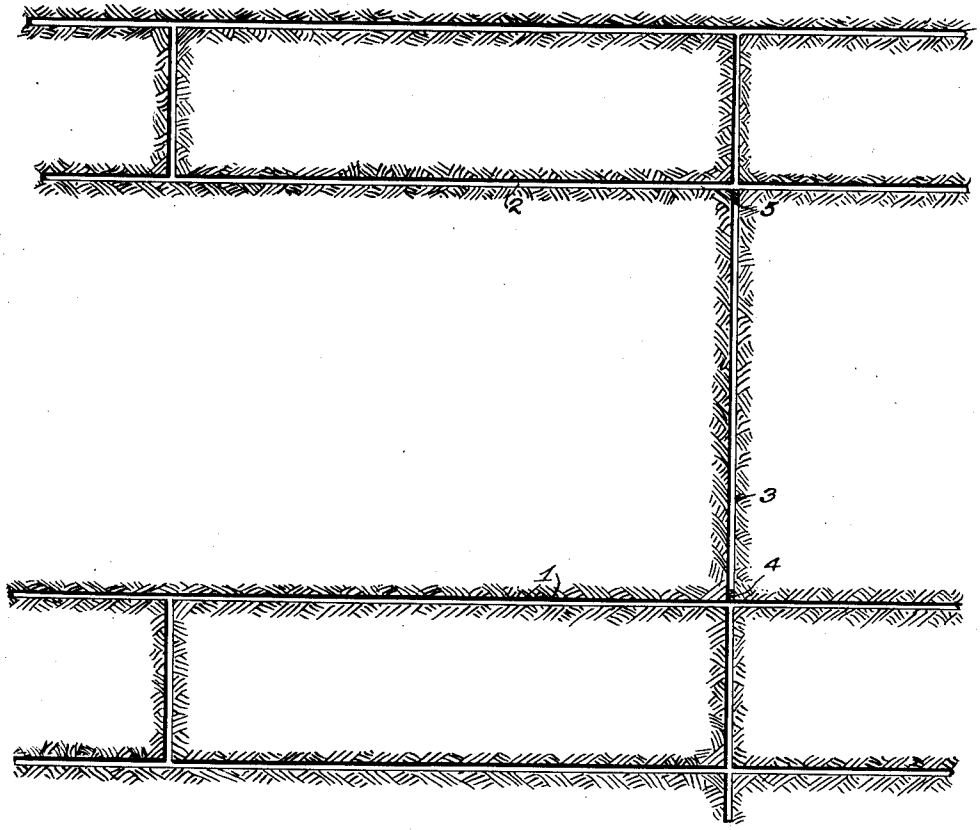
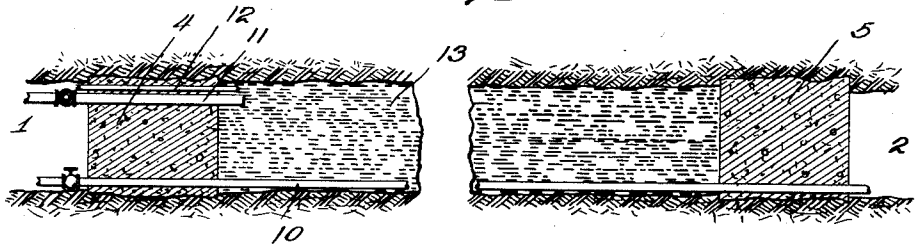


Fig. 2.



Inventor

Ewart G. Sinclair

By O'Neill & Bunn

Attorneys

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UNITED STATES PATENT OFFICE.

EWART G. SINCLAIR, OF MARACAIBO, VENEZUELA, ASSIGNOR TO THE MIDWEST REFINING COMPANY, OF DENVER, COLORADO, A CORPORATION OF MAINE.

METHOD OF MINING OIL AND THE LIKE.

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The invention relates to a method of recovering all or practically all of the residual oil in strata which have been mined by means of tunnels or drifts and connecting cross cuts in order to extract the oil by natural drainage, as far as possible, and, to this end, the invention comprises sealing the cross cuts defining a given area of oil bearing sand or rock, and, if necessary, sealing the ends of the galleries and inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the intervening sand or other oil bearing formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery, the galleries preferably being connected by a conduit, so that the fluid pressure medium may be circulated repeatedly and the whole operation carried out at the selected gallery level.

A more or less schematic representation of an installation to carry out the method aforesaid is presented in the accompanying drawings, in which:—

Fig. 1 is a partial plan view of an oil mining system involving parallel galleries and connecting cross cuts in an oil bearing stratum.

Fig. 2 is an enlarged longitudinal cross section through the cross cut, after the latter has been prepared for the operation of the instant method.

It is a well known fact that the present methods practiced for extracting oil from geological formations containing the same do not recover more than a small percentage of the total oil content. For example, in the driven well operations as high as eighty to ninety percent of the oil will be left in the ground, while, according to the most improved mining methods as practiced in France and Germany, thirty-five to fifty percent of the oil content is left in the formation.

The present invention has for its object the substantially complete exhaustion of the oil from strata that have been mined by galleries and connecting cross cuts driven therethrough into which the oil has been collected by natural seepage or drainage, as far as possible, from the adjacent sands.

Referring to the drawings, 1 and 2 represent two galleries or tunnels driven or excavated in the oil bearing stratum, said galleries being connected by the usual cross cut 3. In this method of mining the oil sands, the oil contained in the formation drains or seeps through the walls or faces of the drifts and cross cuts and collects in the usual gutters provided therein, which drain the oil into a common sump or pit from which the oil is pumped to the surface. While a relatively large proportion of the oil may be recovered by these mining operations, when carried out in the most efficient manner, it has been found that a large residuum of the oil is left in the strata of sand or sand stone, which could not be recovered by any operations heretofore known. As these mining operations have usually been carried out by advancing the galleries and cross cuts, after the oil in the mined sections has been recovered as far as possible, the method constituting the present invention may be carried out upon each section, after the same has ceased to produce further oil by natural drainage. In carrying out the new method, the cross cuts, such as 3, on each side of a given section or area of oil bearing sand is sealed against the ingress of fluid, preferably by constructing concrete bulkheads 4 and 5 at the portals of the cross cut, where the latter join the drifts or tunnels 1 and 2 and filling the cross cut with mud through a supply pipe 11 passing through bulkhead 4, a suitable vent pipe 12 being likewise located near the top of said bulkhead to permit the escape of air from the cross cut, as the mud enters. Before erecting the bulkheads, a line or pipe 10 is laid in the cross cut between the drifts or tunnels 1 and 2, which serve as a means for returning the fluid pressure medium employed in extracting the residual oil. If the drifts or tunnels 1 and 2 are too long or too extensive, the drifts may also be bulkheaded at suitable intervals to prevent the escape of the fluid pressure medium. After the body of sand, from which the residual oil is to be extracted, has been defined by the bulkheaded cross cuts and drifts, one of the drifts, such as 1, is filled with a fluid pressure medium, such as water, air or gas, which is subjected to sufficient pressure to force the medium through the intervening body of sand or sand stone containing the residual oil into the adjacent drift 2, the movement of the pressure medium through the oil bearing body entraining and carrying with it the oil which is collected in the drift 2. The

fluid pressure medium is then preferably returned to drift 1 by way of pipe 10, where it may be forced again through the body of sand, or the like, between drifts 1 and 2 to extract a still further portion of the oil until substantially all of the oil has been recovered and discharged into drift 2.

As indicated, this method is carried on successively, as the initial mining operations are completed, the cross cuts and drifts being bulkheaded wherever necessary to define the particular area of oil bearing sand to be treated according to the present method.

Obviously, instead of mudding up the cross cut 2, the walls thereof may be lined with cement or any other medium that will prevent the escape of the fluid pressure medium employed to extract the oil into the cross cut. The advantage of mudding the cross cut, however, is the fact that any pressure induced in the cross cut will cause the mud to fill up all cracks and crevices in the walls of the cross cut and effectively seal the same against pressure from without. An additional advantage of the use of concrete bulkheads and mud filling for the cross cut is that this installation provides an effective cushion, in the event of an explosion in the mine. Also, if the ground begins to move or the concrete bulkhead is cracked, the thick mud will work its way into the cracks and effectively seal the same and render the bulkhead again fluid tight.

What I claim is:

1. The method of extracting oil from formations intersected by spaced galleries and connected cross cuts, which comprises sealing the cross cuts on each side of a given section of the formation against ingress of fluids, and inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery.

2. The method of extracting oil from formations intersected by spaced galleries and connected cross cuts, which comprises sealing the cross cuts on each side of a given section of the formation against ingress of fluids, inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery, and returning the fluid pressure medium to the first mentioned gallery.

3. The method of extracting oil from formations intersected by spaced galleries and connected cross cuts, which comprises bulkheading and sealing the walls of the cross cuts on each side of a given section of the formation against ingress of fluids and inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery.

4. The method of extracting oil from formations intersected by spaced galleries and connected cross cuts, which comprises bulkheading and filling with mud the cross cuts on each side of a given section of the formation, and inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery.

5. The method of extracting oil from formations intersected by spaced galleries and connected cross cuts, which comprises connecting the galleries by a conduit laid in one cross cut, sealing the cross cuts on each side of a given section of the formation against ingress of fluids, and inducing a fluid pressure in one gallery sufficient to cause a flow of the fluid pressure medium through the formation between the galleries, whereby the oil will be carried by said medium into the adjacent gallery.

6. The method of extracting oil from formations containing the same, which comprises transsecting the formation by impervious dams on two opposite sides, providing openings into the formations on each of the other sides, introducing fluid under pressure into the formation through one of said openings, and collecting the oil entrained by said fluid in the other opening.

In testimony whereof I affix my signature.

EWART G. SINCLAIR.