Nov. 24, 1925. 1,562,541

S. H. CORFIELD

OIL SHALE RETORT

Original Filed May 10, 1922 3 Sheets-Sheet 1

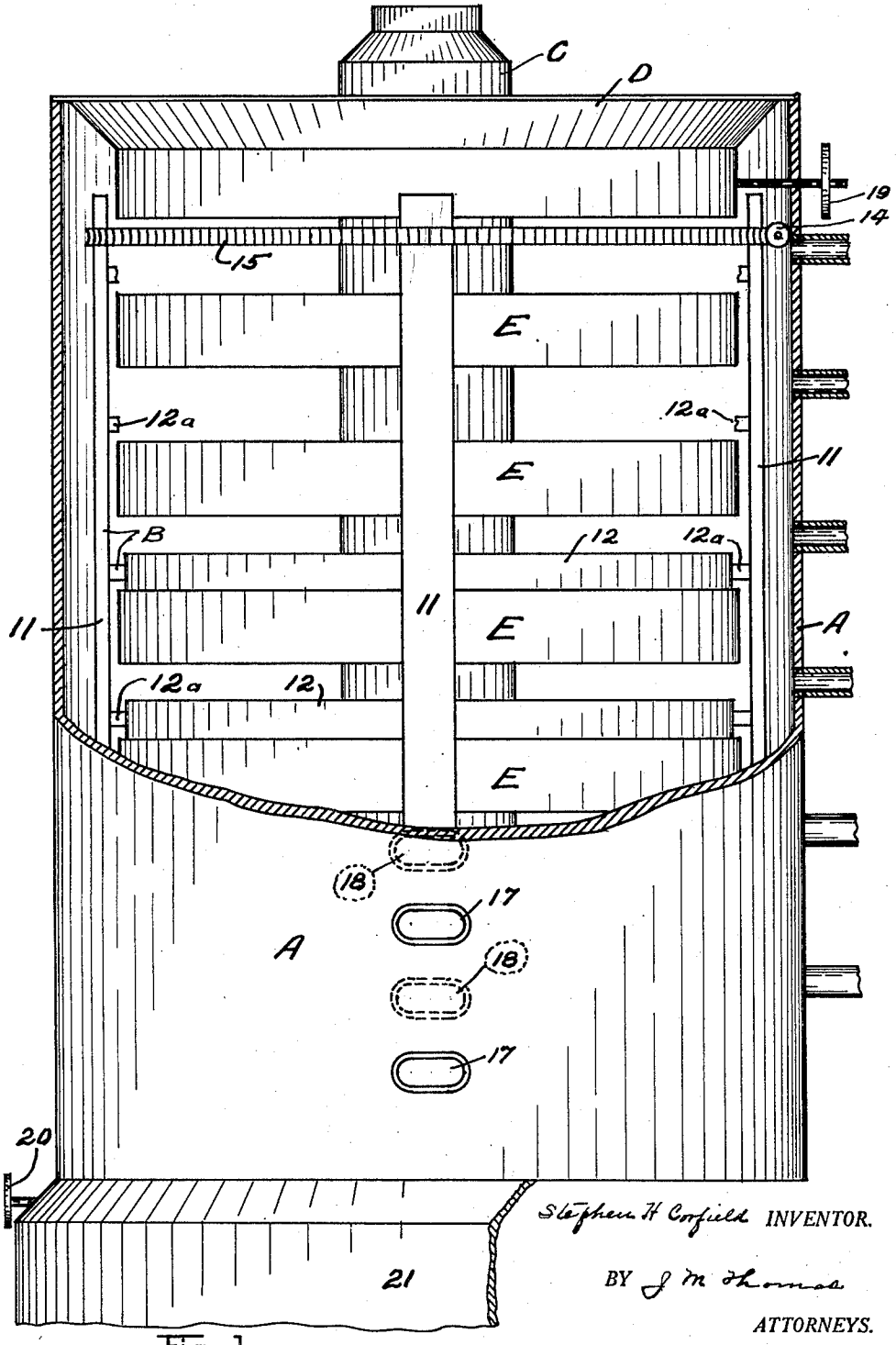


Fig. 1.

Stephen H. Corfield INVENTOR.

BY J. M. Thomas

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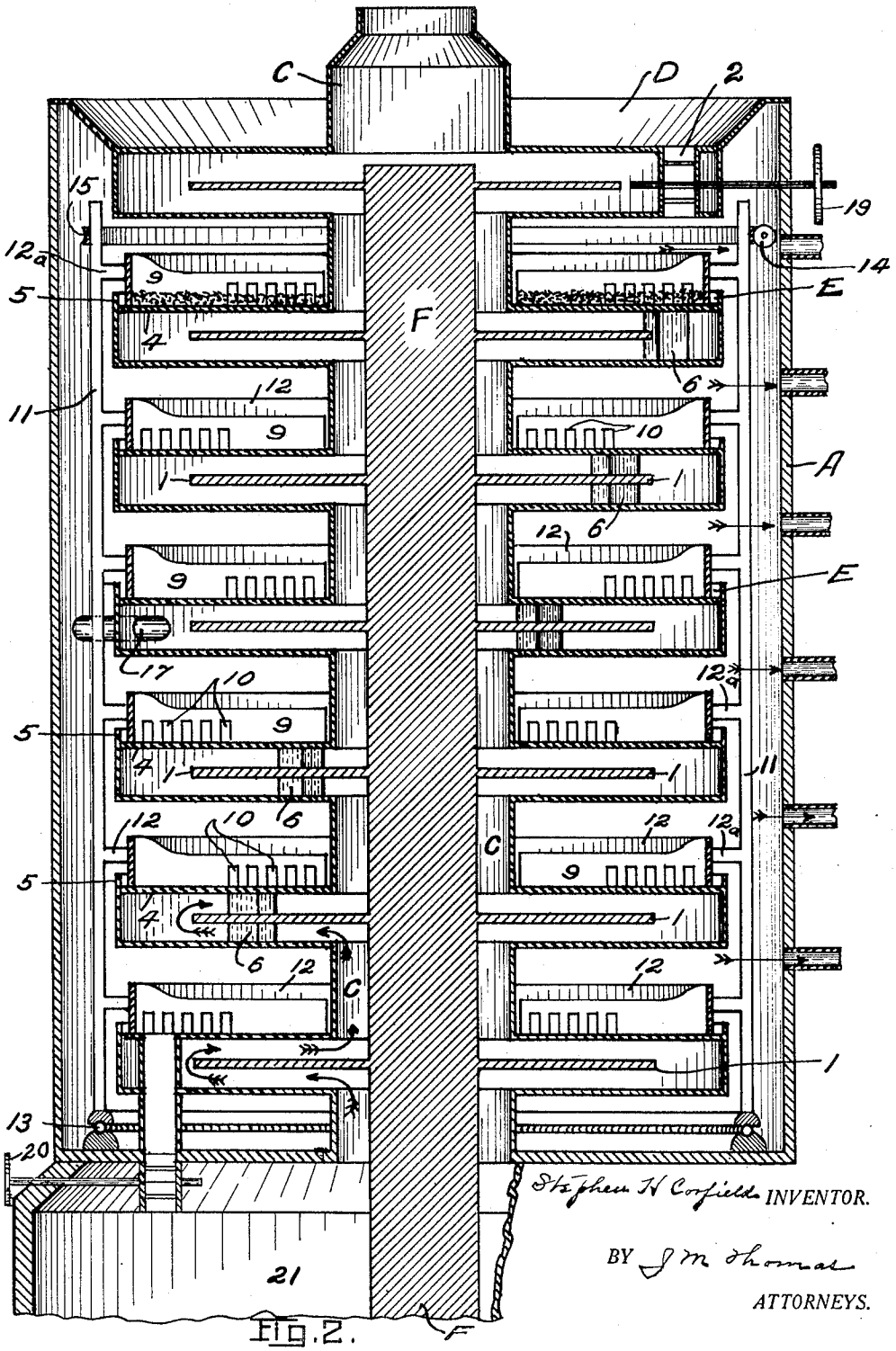


Fig. 2.

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OIL SHALE RETORT

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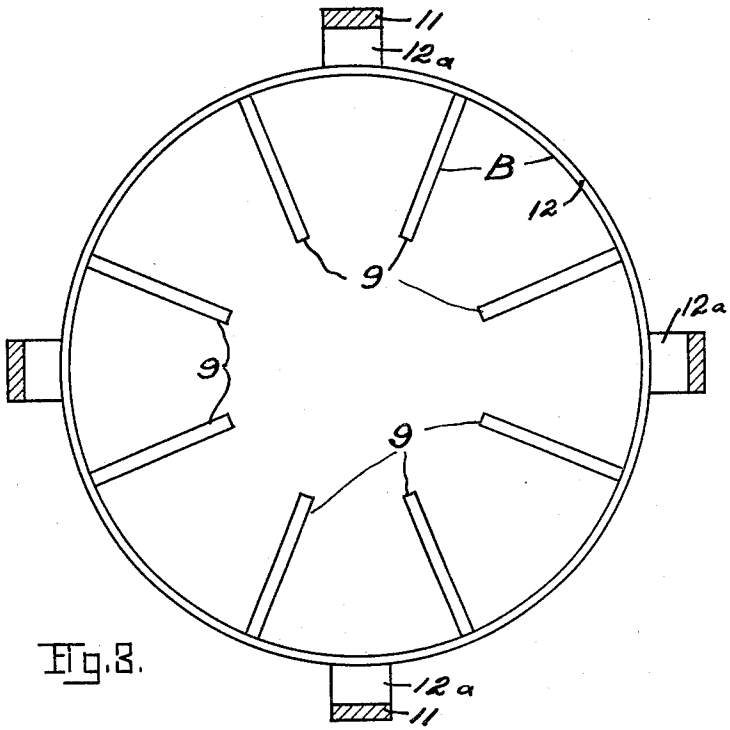


Fig. 8.

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UNITED STATES PATENT OFFICE.

STEPHEN H. CORFIELD, OF SAN DIEGO, CALIFORNIA.

OIL-SHALE RETORT.

Application filed May 10, 1922, Serial No. 559,839. Renewed August 26, 1925.

To all whom it may concern:

Be it known that I, STEPHEN H. CORFIELD, a citizen of the United States, residing at San Diego, in the county of San Diego, and State of California, have invented certain new and useful Improvements in Oil-Shale Retorts, of which the following is a specification.

My invention relates to apparatuses for obtaining oil from oil shale and other like material, and has for its object to provide an apparatus whereby a continuous flow of crushed shale may be fed into and passed through apparatus within a heated vertical chamber wherein the heat varies from near the furnace thereunder to near the upper end with a difference of about seven hundred degrees ranging from nine hundred around the bottom table to two hundred degrees around the upper table, whereby partial volatilization of the oil content of the shale is effected and the gas is removed through pipes entering the interior of said chamber at different levels for condensation in any style or form of condensers desired.

A further object is to provide means to stir the moving mass of shale while it is in transit through the apparatus to aid volatilization and prevent any tendency to agglomerate and form a sticky, gummy mass of the material while under treatment.

These and other objects which will be apparent I accomplish with the apparatus illustrated in the accompanying drawings in which similar letters and numerals or reference indicate like parts throughout the several views and as described in the specification forming a part of this application and pointed out in the appended claim.

In the drawings in which I have shown a substantial embodiment of my invention, Figure 1 is a view in elevation of my apparatus with parts cut away and omitted to show the other parts more clearly. Figure 2 is a vertical diametrical section of the apparatus. Figure 3 is a plan view of one of the scraping elements operable thereover with portions of the frame.

The present invention consists of a vertical cylindrical retort or outer casing A, which has a furnace thereunder for generating heat. The heat of said furnace is conducted upwardly, and by means of the baffle plates 1 is distributed under and around a plurality of pans or tables E which are positioned one above the other within said casing A, and around a central flue C. The oil-bearing shale is fed into a hopper D, forming the upper end and cover for said casing A, which hopper has a discharge opening 2 in its bottom, and the shale as it is pushed through said opening 2 falls into or on one of the annular tables E. A plurality of said tables E are provided and positioned, one above the other, in spaced relation to each other and concentrically within said casing A, and resting on the bottom of said casing A. A supporting column F is provided axially within said casing A and the said baffle plates 1 which are given an annular form are rigidly fastened on said column or may be integral therewith. The said baffle plates 1 are positioned between said tables to direct the heat of the furnace over the material and under the table on which each load is carried, as shown by the arrows. The said flue C is concentrically positioned as to said column F and said casing A, and is directly connected with the draft from the furnace, and also supplies some of the heat indirectly to the interior of said casing A. Each of said tables E consists of an annular cylindrically shaped cup having a flat bottom and rather low side walls 5, and are fastened to said flue C. Each of said tables E has a discharge opening 6 in its bottom, and said openings are offset as to position both radially and circumferentially in order that one table may act as a partial closure or seal for the one below it. In each of said tables E is operated a plurality of scrapers 9, each of which is slidable on its respective table and each consists of a blade in one end of which slots 10 are cut opening to the lower edge, thus forming a rake portion on one end of each of said blades. The said scrapers 9 are fastened in a radial position relative to said tables and casing A, on frame B. The said frame B is constructed of vertical bars 11, preferably four in number, which are held in position by the rings 12, with a lug 12^a connecting the rings 12 with the bars 11, and the said scrapers are fastened to said rings 12. The said frame B rests on and is carried on ball-bearing 13 supported on the bottom of said casing A. The said frame B is made to rotate around said flue C by a worm pinion 14, the teeth of which engage the teeth of a gear wheel or rack 15 formed integral with or secured on the upper of said rings 12 or the bars 11. As said frame B is rotated the said

scrapers 9 are moved radially around close to the bottom of said tables E, thereby moving or scraping the material around on said table and discharged through the opening 6 therein.

The operation of my apparatus is as follows:—Heat is supplied from the furnace 21 and directed upwardly through the flue C around the baffle plates as indicated by the arrows. Crushed shale is fed into the hopper D and discharged through the opening 2 by the sealing paddle wheel operated therein by the shaft and pulley 19. The shale is fed onto the tables E in a thin sheet, preferably one-half inch, and as turned over and moved forward by the scrapers 9 is carried around on said tables to the discharge opening 6 in the bottom thereof and falls from one table onto another as pushed through the said opening 6 by the successive scrapers 9, thereby giving almost a continuous flow of material through my retort. The form of the blades 9 is such that the rake portion of one scraper is followed by the blade portion of the next scraper in position. The purpose of using rake and blade combined in each scraper is to stir the shale and at the same time move it forward in its travel through the retort. The heat is applied both to the under side of the table and to the shale on the top or upper portion of the table. The frame B made up of the vertical bars 11 and rings 12 forms one continuous scraper element, the bottom of which is supported by the ball bearings 13 and said scrapers are operated within the pan shaped tables E. The discharge from the last table E is through the bottom of the table and chute 6 over a paddle wheel 20 operated within said chute which seals the bottom of my retort as the upper wheel 19 seals the upper end or top of my retort. As will be obvious, any desired number of tables and scrapers may be used as the operator desires to construct and the capacity of my plant may be large or small as the number of tables and the size of each table with the other connected elements are constructed. I have shown clean-out ports 17 through the wall of said casing A and clean-out openings 18 to the interior of said tables and scrapers for the purpose of repairs and cleaning out any accumulation of soot or other matter that would be a detriment to the free movement of my scrapers and draught.

Having thus described my invention and its operation I desire to secure by Letters Patent and claim:—

An oil shale retort comprising a casing having a closed top and bottom and through which oil shale is passed; a plurality of spaced apart superimposed tables concentrically within said casing; a vertical support centrally in said casing and tables; a plurality of baffle plates secured on said support and spaced between said tables to direct currents of heat around said tables; a skeleton frame operable concentrically within said casing; a plurality of scrapers carried by and operable with said frame and spaced one above each of said tables, and having a portion of each scraper cut into blades, with the blade portions alternately staggered in relation to the uncut portions; with means to rotate said frame and scrapers to move shale from one table to the table below it through an opening cut in the floor of the table offset in position relative to the other openings.

In testimony whereof I have affixed my signature.

STEPHEN H. CORFIELD.