

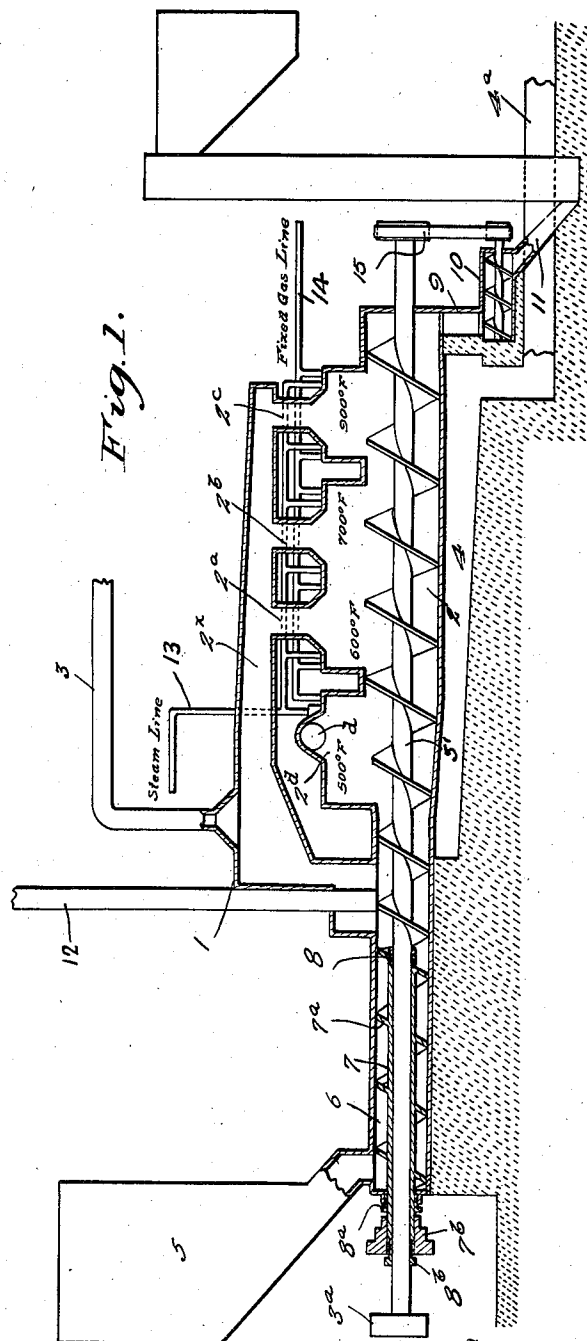
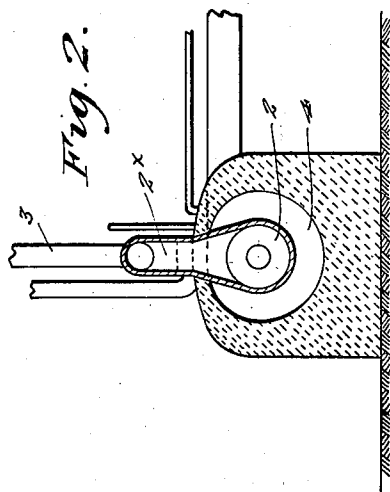
Nov. 27, 1923.

1,475,901

C. W. THOMPSON

APPARATUS FOR DISTILLING HYDROCARBONS

Filed Jan. 27, 1922



Inventor
Carey W. Thompson

Witness
R. Q. Thomas

By *Spencer Middleton Donaldson & Hall*
Attorney

Patented Nov. 27, 1923.

1,475,901

UNITED STATES PATENT OFFICE.

CAREY W. THOMPSON, OF DENVER, COLORADO.

APPARATUS FOR DISTILLING HYDROCARBONS.

Application filed January 27, 1922. Serial No. 532,128.

To all whom it may concern:

Be it known that I, CAREY W. THOMPSON, a citizen of the United States, and resident of Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Apparatus for Distilling Hydrocarbons, of which the following is a specification.

My present invention concerns an improved apparatus for use in the treatment of hydrocarbon oil or vapors, and relates more particularly to apparatus designed for use in carrying out the method of treatment which forms the subject of an application filed by myself and H. C. Beeler on the 29th day of September, 1921, Serial No. 504,247.

The invention aims to provide a construction in which all tendency of the clogging of the granular material used as a carrier for hydrocarbon as it is conveyed through the apparatus will be avoided, such clogging being likely to occur unless specific provision is made to prevent it, due to the fact that there is an expansion of the material conveyed by the conveyor, due to the increased temperature thereof in the retort.

The invention further aims to provide in connection with such a retort conveyor feed mechanism having a variable speed control whereby the quantity of material fed to the retort may be varied at will.

Another object is to provide a retort with a sealed discharge which will prevent any passage of air back into the retort.

With these and other objects in view, the invention includes the novel features of construction and arrangement and combination of parts hereinafter described, and particularly defined by the appended claims.

An embodiment of my invention is illustrated in the accompanying drawings, in which:

Figure 1 is a sectional elevation of my improved apparatus, and

Figure 2 is a transverse section.

Referring by reference characters to these drawings, the numeral 1 designates the converter as a whole, and as this, except in the features hereinafter referred to, forms no part of the present invention, specific description of all of the parts shown is deemed unnecessary. It suffices to say in this connection that the converter comprises a substantially cylindrical retort member 2 which extends longitudinally through the converter, and which is open at its upper side

into a chamber 2^x through ports 2^a, 2^b, and 2^c, which chamber communicates at its initial end with a gas delivery, pipe 3, through which vaporized products from the heated hydrocarbon are conveyed for further treatment, and also with the feed end of the retort. It also comprises a chamber 2^d which may communicate by a delivery pipe *d* with a superheater, not shown.

The retort is designed to have pulverulent or granular material supplied thereto, such as granular carbon containing material, coal, spent shale, or oil bearing shale, according to the manner of use of the apparatus, by the feed mechanism hereinafter more particularly described, the said material being conveyed through the retort by the conveyor screw 3' and the retort being heated by the heat chamber 4, to which heating apparatus vapors or gases may be supplied through pipe 4^a from any suitable source, not shown.

A hydrocarbon oil is delivered from a suitable source through pipe 12 to the granular material within the conveyor, which thereupon becomes coated with such hydrocarbon. This mass is progressively heated as it passes through the apparatus, vapors liberated at different temperatures passing upward through ports *d*, 2^a, 2^b and 2^c, from which they may be taken to other apparatus for further treatment as desired. Passage 2^x also communicates with the cold end of the conveyor and allows any heavy distillate to be reconveyed through the apparatus. The presence in the apparatus of steam or a fixed gas, such as CO₂, has been found beneficial, and I provide for its introduction as by pipes 13 and 14.

I have found that if the retort is made of uniform diameter and the helical conveyor of uniform pitch, the granular material has a tendency to expand under the action of the heat at the initial end of the retort, and to clog or load up the retort beyond its capacity. To prevent any danger of such clogging action, I make the retort of a gradually increasing diameter or cone shape from a point in the first hot chamber where the shale, coal or other material begins to be heated and therefore to swell or expand under the action of the heat, to about the point where the first hot chamber is divided or separated from the second hot chamber, and the screw and chamber then continue from this point at this increased diameter without further change to the delivery end of the

screw and retort. This affords increased space between the blades where it is needed for the expansion of the material, while at the same time its rate of progress through the retort is not changed.

It will be apparent that the conveyor chamber is open at its top portion, except for the downwardly extending partitions between ports, which portions are hollow, and that the conveyor chamber is a chamber of reduced diameter underlying the same.

Power may be applied to drive the conveyor screw 3' in any suitable manner, conveniently by extending the shaft through the front end of the retort and providing it with a driving pulley 3^a. The granular material is supplied to the retort by a hopper 5 which delivers at its lower end into a feed chamber 6 within which is located a feed screw 7^a carried by a hollow shaft 7 rotatably mounted upon the shaft of the main conveyor. Means are provided by which this feed screw may be rotated continuously at any desired speed, and such variable speed driving mechanism may be of any desired form, as for instance, step pulleys, as indicated at 7^b. The joints are provided with suitable stuffing boxes, as conventionally illustrated at 8, 8^a and 8^b.

By this arrangement the material may be delivered in a continuous manner from the hopper to the feed screw, but at a rate which will be found most suitable to carry out the process.

In order to properly deliver the material from the delivery end of the conveyor while maintaining a closure or seal against entrance of air, I provide the retort at the delivery end with a depending leg 9 which delivers at its lower end into an outlet

chamber 10, of cylindrical form, within which is located a delivery screw which delivers the material into a discharge spout 11, the body of material passing through the chamber 10 serving to seal the retort against the entrance of air.

The delivery screw may be driven in any suitable manner conveniently from a projected end of the conveyor shaft by means of belting, indicated at 15.

While I have shown the feed screw as located in longitudinal alignment with the conveyor screw, it will be understood that this is illustrative of my preferred form and that my invention is not limited to this specific arrangement, as it is obvious that the delivery screw might deliver into the initial end of the retort at any angle which might be desired.

Having thus described my invention, what I claim is:

An apparatus for the distillation of hydrocarbons, including an elongated retort, a chamber therein containing a conveyor, a heat chamber under a part of said conveyor, said conveyor increasing in diameter from a point over the beginning of the heat chamber to a point intermediate the beginning and end of said heat chamber, said conveyor being of uniform diameter for the remainder of its length, said conveyor chamber having an enlarged portion above the conveyor and a series of ports leading to a take-off above the chamber, said take-off communicating with that portion of the conveyor chamber not over the fire chamber.

In testimony whereof, I affix my signature.

CAREY W. THOMPSON.