May 4, 1937. R. M. PARSONS 2,079,333

LIQUID TREATING VESSEL AND SUPPORT THEREFOR

Filed March 2, 1935

Fig. 1

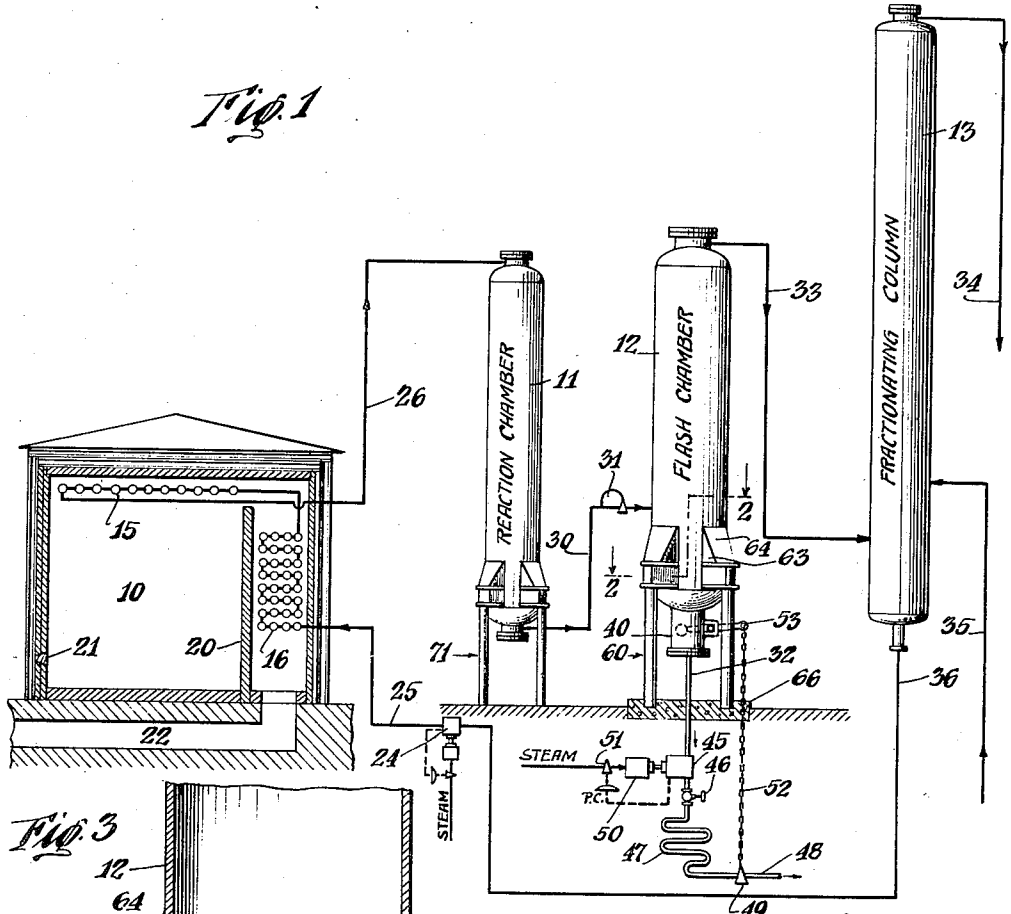


Fig. 3

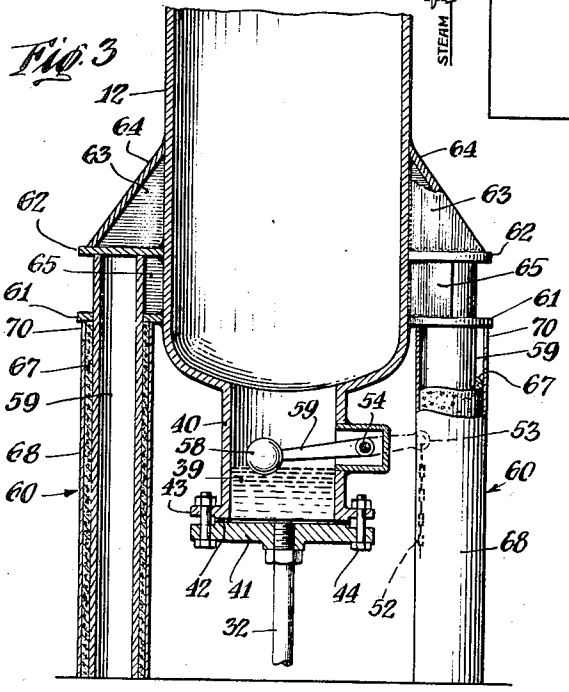
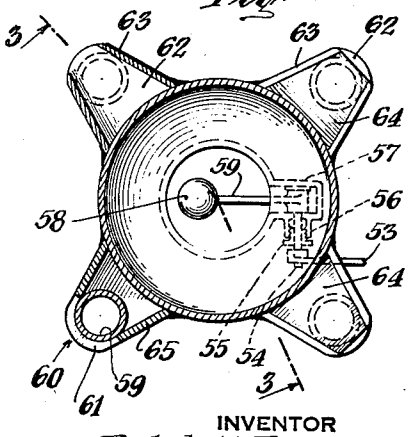


Fig. 2



INVENTOR
Ralph M. Parsons
BY
ATTORNEY

Patented May 4, 1937

2,079,333

UNITED STATES PATENT OFFICE

2,079,333

LIQUID TREATING VESSEL AND SUPPORT THEREFOR

Ralph M. Parsons, Mount Vernon, Ohio, assignor to The Ralph M. Parsons Company, Mount Vernon, Ohio, a corporation of Delaware

Application March 2, 1935, Serial No. 8,989

1 Claim. (Cl. 196—132)

This invention relates to a method and apparatus for the heat treatment of hydrocarbon oils and more particularly to a flash chamber for an oil cracking plant and to a method of operating the same.

An object of the invention is to improve the operation of a flash chamber.

Another object is to provide improved means for the removal of the residuum from the flash chamber.

Another object is to provide an improved supporting means for a large vessel.

Another object is to provide a simple, dependable and efficient device for the purposes above indicated.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the claim appended hereto, the invention itself, as to its objects and advantages and the manner of its operation, will be better understood by referring to the following description taken in connection with the accompanying drawing forming a part thereof, in which:

Fig. 1 is a diagrammatic representation of an oil cracking plant illustrating one embodiment of the present invention;

Fig. 2 is a horizontal section of the flash chamber taken on the line 2—2 of Fig. 1; and

Fig. 3 is a vertical section thereof taken on the line 3—3 of Fig. 2.

In the following description and in the claim certain specific terms have been used for convenience in referring to various features of the invention but it is to be understood that they are to be interpreted as broadly as the art will permit.

Referring to the drawing more in detail, the invention as shown is applied to a conventional type of oil cracking plant having a furnace 10, a reaction chamber 11, a flash chamber 12 and a fractionating column 13.

The furnace 10 may include, for example, a set of radiant heat tubes 15 and a bank of convection tubes 16 in which the oil is heated to the required temperature for cracking. The furnace may be provided with a bridge wall 20 and burners 21 which are adapted to direct the flame thereagainst. The combustion gases may pass over the bridge wall 20 and over the bank of convection tubes 16 into a duct 22 which leads to a stack, not shown.

In normal operation, oil for cracking is pumped by means of a hot oil pump 24, through an inlet pipe 25 to the bank of convection tubes 16, thence through the radiant heat tubes 15 wherein it is raised to cracking temperatures. The oil, still at high pressure and at cracking temperature, is then discharged from the furnace through the pipe 26 to the top of the reaction chamber 11 wherein the vapor remains a sufficient length of time for the cracking reactions to be completed. From the bottom of the reaction chamber 11 the oil and vapor pass through a pipe 30 and a pressure reduction valve 31 into the flash chamber 12 wherein the low boiling constituents are separated from the heavy residuum which may be removed from the bottom of the flash chamber through the discharge pipe 32. The vapor, which contains the lower boiling constituents, is removed from the top of the flash chamber, through a pipe 33, and is passed to the fractionating column 13 wherein the different boiling constituents are separated in the usual manner.

The vapors, containing the gasoline or other constituents which it is desired to utilize, may be removed from the fractionating column through a pipe 34 and applied to suitable storage or separating apparatus, not shown. The raw oil charge may be applied to the fractionating column 13 by means of an inlet pipe 35. The liquid which separates from the vapor and collects at the bottom of the fractionating column is withdrawn through a pipe 36 which leads to the suction side of the hot oil pump 24 above mentioned.

The above described apparatus is of standard construction and only so much thereof has been set forth as is necessary to an understanding of the present invention.

In the operation of the above type of process the heavy residuum collects at the bottom of the flash chamber in contact with the hot vapor therein. The heat derived from the hot vapor tends to convert the residuum to coke if the residuum remains in contact therewith for any substantial length of time. The present invention accordingly provides for the prompt and efficient removal of the residuum without affecting the normal operation of the flash chamber.

In one embodiment this is accomplished by providing a housing 40 forming a well 39 of small diameter at the bottom of the flash chamber 12. The housing 40 may be formed integrally with the flash chamber or may be formed separately and welded thereto. It may be closed by a seal-

ing ring 42 and a cover 41 which may be clamped to a flange 43 formed on the housing 40, as by bolts 44. The discharge pipe 32 may be threaded into the cover 41 to permit the removal of the residuum therethrough.

For effecting the desired control of the residuum, the pipe 32 leads to a constant pressure pump 45, which discharges through a valve 46, a cooler 47 and a pipe 48 having a float operated valve 49. The pump 45 may be driven by a steam engine 50, the steam supply to which may be controlled as by a valve 51 actuated in accordance with the discharge pressure of the pump 45 so as to maintain said pressure constant.

The valve 49 may be controlled by a chain or link 52 attached to a lever 53 which is carried on a shaft 54 extending through a bushing 55 in a support 56. The support 56 may be carried by a housing 57 which may be secured to the housing 40, as by welding, and may open into the interior of the well 39. A float 58 may be carried by a rod 59 which is secured to the shaft 54. The float 58 is actuated by the level of the liquid within the well 39 and opens or closes the valve 49 to regulate the passage of liquid through the pipe 48 so as to maintain the residuum in the well 39 at a constant level. The pump is automatically regulated by the means above described to maintain a constant discharge pressure at all positions of the valve 49.

The residuum is reduced in temperature in the coolers 47 immediately after withdrawal from the flash chamber so as to prevent coking in the discharge pipe and in the valve 49.

In the operation of the above described device the quantity of liquid in contact with the vapor is reduced to a minimum by the expedient of using a well of small cross-section and by maintaining a level of liquid therein which is only sufficient to cover the discharge pipe 32 and to ensure the provision of a seal within the chamber for preventing escape of the vapor therefrom. The residuum is removed from the flash chamber as rapidly as it is formed and before appreciable coking reactions can occur. This facilitates maintenance and eliminates frequent shutdowns for coke removal and cleaning.

For supporting the flash chamber 12 there are provided a plurality of legs 60, preferably four in number. Each leg 60 comprises a tubular member 59 such as a steel rod, to which a pair of cross plates 61, 62 are secured as by welding. The cross plates 61, 62 may be butt-welded to the outside surface of the flash chamber. Compression members such as triangular bracing plates 63 may be secured, as by butt-welding to the plate 62 and to the outer surface of the flash chamber. A cover plate 64 may be secured between the bracing plates 63. Side plates 65 may extend between the plates 61, 62 from the tubular member 59 to the outer surface of the flash chamber to enclose the assembly and to increase the strength thereof.

All of the joints of the various plates to the tubular member 59 and to the chamber wall are preferably butt-welded so as to form a rigid mounting for the legs. The plates in effect form an open box or truss, the edges of which may readily be secured to the chamber and which is adapted to support the weight of the flash chamber without distortion. The flash chamber may be constructed at the factory with the legs 60 and with the housing 40 attached thereto so that the construction work in the field is reduced to a minimum.

A base 66 of suitable material such as concrete may be formed with recesses adapted to receive the legs 60. The legs may be secured in said recesses as by concrete. They may also be provided with an outer coating 67 of concrete which strengthens and protects them. This coating 67 may be applied after the chamber is erected by positioning a thin shell 68 such as steel around the tubular members 59 and leaving a suitable opening 70 through which the concrete may be formed. The shell 68 may remain in position to protect the concrete from damage.

It is obvious that the specific form of the legs and of the means for attaching them to the chamber walls may be varied by a person skilled in the art without departing from the scope of the invention. A preferred embodiment has been shown for purposes of illustration only.

It is also obvious that similar supporting legs may be used for the other pieces of apparatus. For example the reaction chamber 11 is shown as supported by legs 71 which are of a construction similar to the legs 60 above described. The fractionating column 13 and the other vessels of the plant may be similarly supported if desired.

It is to be understood that both the specific form of the supporting legs and the specific means for discharging the residuum from the flash chamber may be varied in various details from the embodiment of the invention shown herein. The invention is accordingly to be limited only in accordance with the following claim when interpreted in view of the prior art.

What is claimed is:

In combination, a flash chamber for an oil cracking plant having a bottom well of smaller cross-section than said chamber adapted to receive liquid therefrom, a discharge port in said well below the level of said liquid, a float in said well operable in response to changes in liquid level therein, a discharge line connected to said port, said line having a valve to control the rate of discharge of the liquid, a cooling coil in said line ahead of said valve to cool the liquid prior to passage therethrough for preventing coking or clogging of said valve, a constant pressure pump in said line ahead of said cooling coil to rapidly withdraw liquid from said well when said valve is open but being adapted to prevent excessive pressures from being developed when said valve is closed or restricted and means connecting said float to said valve for automatically operating said valve so as to maintain a liquid level in said well sufficient to cover said discharge port while maintaining a small exposed surface and a minimum quantity of liquid in said well whereby the liquid is rapidly withdrawn from the chamber and transfer of heat thereto is reduced to a minimum.

RALPH M. PARSONS.