

UNITED STATES PATENT OFFICE.

DANIEL PYZEL, OF PIEDMONT, CALIFORNIA, ASSIGNOR TO SIMPLEX REFINING COMPANY, OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PRESSURE STILL FOR OIL REFINING.

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To all whom it may concern:

Be it known that I, DANIEL PYZEL, a subject of the Queen of the Netherlands, residing at Piedmont, in the county of Alameda and State of California, have invented a new and useful Improvement in Pressure Stills for Oil Refining, of which the following is a specification.

My invention relates to the art of which refining hydrocarbon oils and particularly to what is known as cracking stills which are commonly used in this art. It is a well known fact that if hydrocarbon oils are subjected to high pressures at high temperatures a change in the molecular structure of the oil takes place, lighter hydrocarbons passing off as vapor and a residuum which contains an excess of carbon being left. It has been found that where a body of such oil is heated in a still, the bulk of this oil being maintained constant by the injection of fresh oil to replace the vapors taken off, distillation can be carried on for considerable periods before difficulties are encountered due to the presence of free carbon in the still. The free carbon has, however, a considerable tendency to adhere to metal surfaces and the operation of pressure stills has always been somewhat hazardous due to the rapid building up of carbon on the heating surfaces which is likely to occur when the distillation has proceeded to a certain point. This building up of the carbon produces a hot spot in the wall of the still as the mass of carbon interferes with the transfer of heat from the shell to the body of oil inside the shell. As soon, therefore, as carbon commences to collect, the temperature of the portion of the still covered by the mass of carbon very rapidly rises. This rapid rise in the temperature of the wall of the still greatly decreases the mechanical strength of the metal with the result that the pressure acting thereon tends to blow it out resulting in injury to the still and in some cases disastrous explosions and loss of life.

It is an object of my invention to provide a pressure still which is so constructed that it can be safely operated, means being provided for detecting the presence of carbon deposits.

Further objects and advantages will be made evident hereinafter.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a cross section through a preferred embodiment of my invention.

Fig. 2 is an enlarged view of the method of inserting the thermostatic element in the wall of the still.

Fig. 3 is a still further enlarged view of the thermostatic element in place in the wall of the still and,

Fig. 4 is a section on a plane represented by the line 4—4 of Fig. 2.

In the form of the invention shown 11 is a pressure still which is preferably made of welded steel having a shell which may be from one to two inches thick. The still is placed inside a furnace 12 which is heated by means of oil or gas burners 13. A stack 14 is provided for carrying off the products of combustion. Oil is introduced into the still through a pipe 15. Vapors are taken off through a pipe 16 and residuum may be drawn off through a pipe 17.

When these stills are used to crack petroleum oils, it is necessary to maintain considerable pressure therein and to maintain the contents at high temperature. Starting with a charge of crude oil, a continuous distillation takes place therefrom, the oil vaporized being replaced by fresh crude oil delivered through the pipe 15. As the distillation continues, the residuum left in the still continuously becomes richer in carbon and eventually this carbon starts to deposit upon the walls of the still. As soon as this deposition has started, the carbon deposits build up very rapidly and form a heat insulating blanket inside the still with the result that the wall of the still becomes overheated and may be forced outwardly by the internal pressure. In the operation of stills of this type, it is common practice to run in several times the initial charge of oil before shutting down the still and withdrawing the residuum through the pipe 17. The distillation may, indeed, be continued until such a time as deposits of carbon start to form and it is the purpose of my invention to provide means for instantly indicating to an operator the formation of any deposits about the wall of the still.

This I accomplish by the use of thermocouples 20 which are embedded in holes drilled in bosses 21 formed on the wall of

the still. These thermocouples are embedded in thermal contact with the wall of the still so that the formation of a carbon deposit, as shown at 22, which raises the temperature of the wall of the still 23 is immediately indicated by the thermocouples. The thermocouples are preferably placed inside a tube 25 which in turn is carried inside a pipe 26 having heat insulation 27 on the outer surface thereof. The pipe 26 passes through a conduit 28 in the wall 29 of the furnace 12. Each of the thermocouples is connected by means of wires 30 with an indicating instrument 31 carried on instrument panel 32. Upon starting, the normal temperature in the walls 23 of the still 11 is indicated by the indicators 31 and the operator of the still watches these indicators for any increase in temperature.

20 In the drawings I show twelve thermocouples 20 placed in the walls of the still 11 and I find that by using this method I am able to detect any excessive rise in temperature in the still wall adjacent to any of the thermocouples. As soon as any such rise occurs, the burners 13 are shut off and the still is allowed to cool. By this method I am able to substitute an accurate indicating method for the present very unsatisfactory trial methods used in the operation of these stills and I am able, to a large degree, to prevent disastrous blowouts or explosions.

I claim as my invention:

35 1. A means for detecting the adherence of heat insulating foreign matter to a surface of a heat transmitting wall comprising a thermometric element embedded in but projecting through only one surface of said wall adjacent to said surface; and means

for indicating to an observer any abnormal rises in temperature of said wall at said element.

2. In a still, the combination of: a furnace; a container in said furnace; and an indicating thermometer embedded in but projecting through only one surface of the wall of said container.

3. In a still, the combination of: a furnace; a container in said furnace; a boss formed on the outer surface of said container having a cavity therein; and a thermometer in said cavity.

4. In a still, the combination of: a furnace; a container in said furnace; a boss formed on the outer surface of said container having a cavity therein; a thermometric element situated in said cavity; and means by which the temperature registered by said thermometric element is indicated to a person outside said furnace.

5. A means for detecting the adherence of heat insulating foreign matter to a surface of a heat transmitting wall comprising a thermocouple embedded in but projecting through only one surface of said wall adjacent to said surface; and means for indicating to an observer any abnormal rises in temperature of said wall at said thermocouple.

6. In a still, the combination of: a furnace; a container in said furnace; and a thermocouple embedded in but projecting through only one surface of the wall of said container.

In testimony whereof, I have hereunto set my hand at San Francisco, California, this 16th day of February, 1922.

DANIEL PYZEL.