

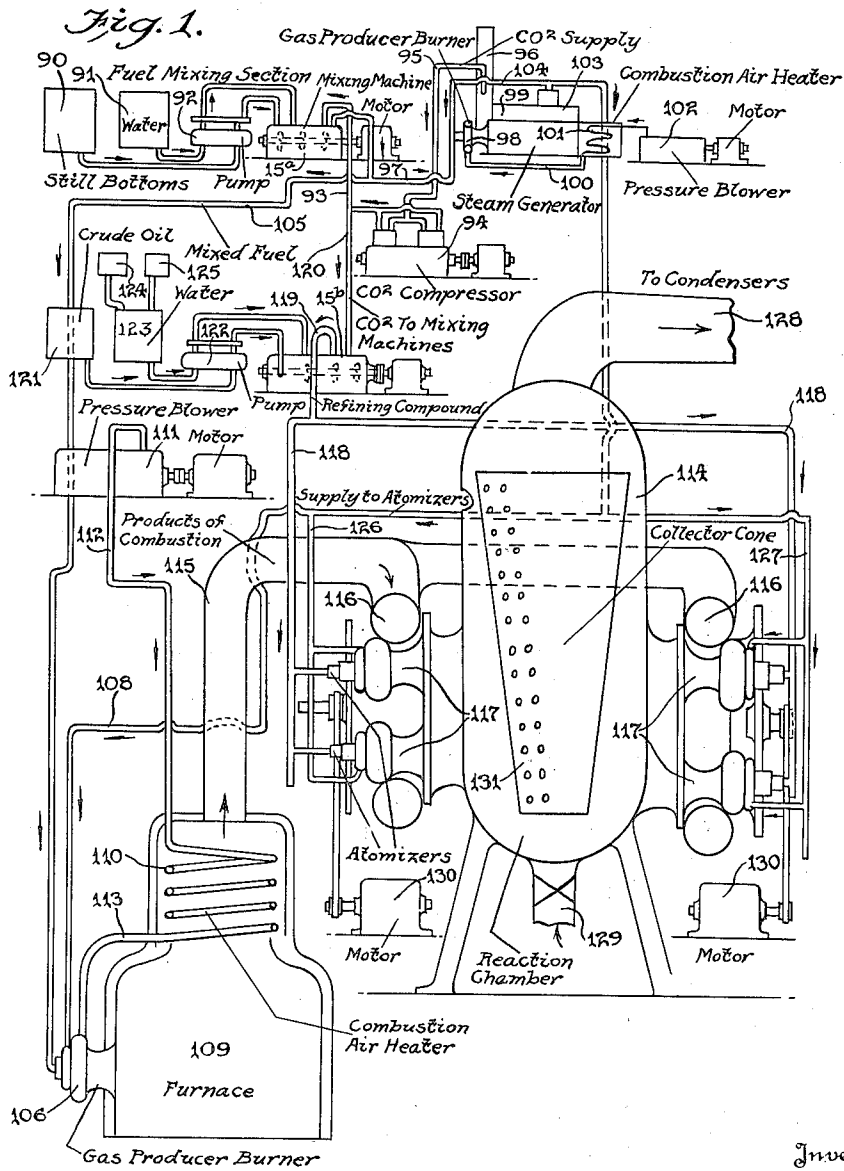
Aug. 21, 1934.

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1,970,771

PROCESS FOR REFINING EMULSIFIED COMPOUNDS

Original Filed Feb. 4, 1930 2 Sheets-Sheet 1



Inventor

R. H. Russell

Seymour Bright

Attorneys

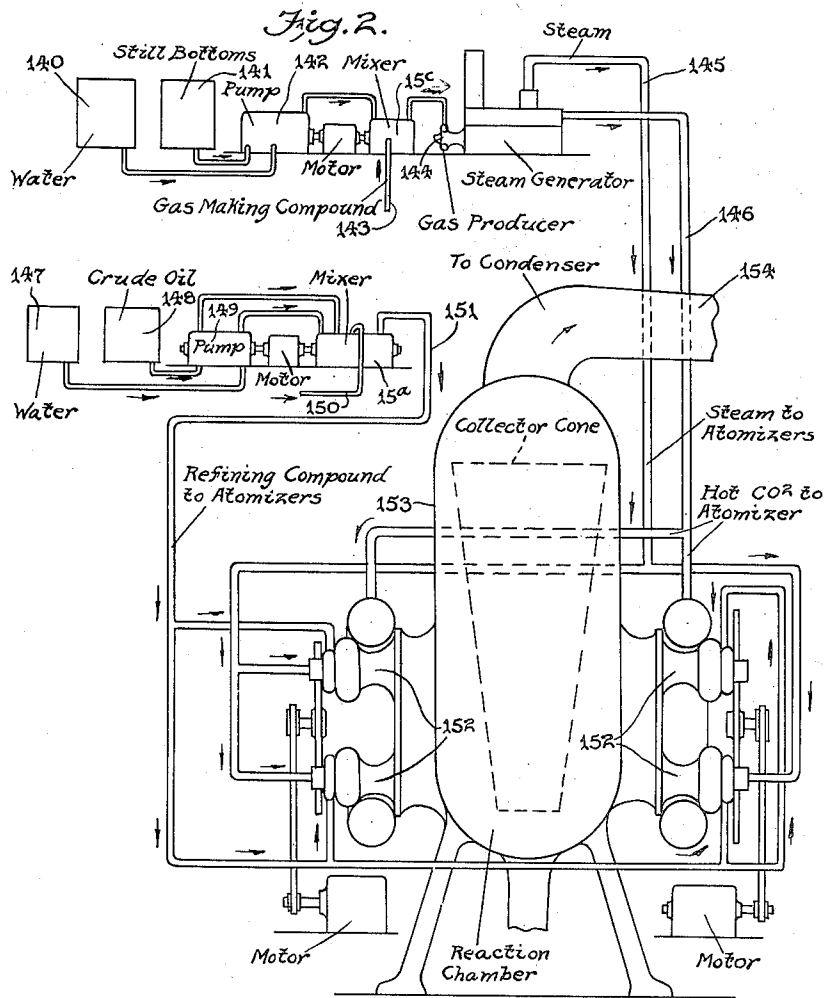
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Inventor

R. H. Russell

By Seymour & Bright

Attorneys

UNITED STATES PATENT OFFICE

1,970,771

PROCESS FOR REFINING EMULSIFIED COMPOUNDS

Robert H. Russell, Cleveland, Ohio, assignor to Gas Fuel Corporation, New York, N. Y., a corporation of Delaware

Original application February 4, 1930, Serial No. 425,857. Divided and this application March 25, 1931, Serial No. 525,295

1 Claim. (Cl. 196—67)

This invention relates to emulsified compositions including hydrocarbons, and more particularly to novel methods for refining such compositions. The present application is a division of my application Serial No. 425,857, filed February 4, 1930.

It is well known that at the present time, oil emulsions are generally treated in order to dehydrate the same. The dehydration methods may be classified into six groups, as follows: 1, gravity settling; 2, heat treatment; 3, electrical treatment; 4, chemical treatment; 5, centrifugal treatment; and 6, filtration. It has been found necessary to treat emulsified oils by such methods before subjecting the oil to refining processes.

One of the objects of the present invention is to incorporate such emulsified oils in emulsified compositions which may be directly treated in order to refine the oil without the necessity of dehydrating the emulsified oil.

Furthermore, I have found that in processing relatively heavy oils, for instance, low A. P. I. gravity hydrocarbons, such as heavy crude petroleum, oil field emulsions, still bottoms and the like, it is advantageous to thoroughly mix the same with aqueous fluids, providing the mixture is admixed with a gaseous agent such as air, gas containing CO₂ or the like. For example, I have discovered that if heavy hydrocarbons, water and a suitable gas are thoroughly agitated in the presence of one another under super-atmospheric pressure, that a composition will result, in which each globule of gas or other elastic fluid is coated with a film of water arranged within a film or coating of the oil, and this compound will remain in such condition indefinitely, so that it may be immediately or subsequently refined for the purpose of converting the heavy hydrocarbons into lighter hydrocarbons.

By adding suitable hydrocarbons for instance, to the heavy oils which are to form constituents of the composition, I can also obtain from the refining of the composition, motor fuels having desired characteristics. For example, if benzol is mixed with the heavy oil that forms a constituent of the composition, and this composition is subsequently refined, for instance, by a cracking operation, motor fuels extracted from the refining process will have benzol characteristics, that is, anti-knock properties.

Another object of the invention is to provide a process in which still bottoms or the like are employed in the manufacture of a composition, particularly suitable for fuel purposes, this composition being mixed with preheated air or its

equivalent under pressure, and also with steam if desired, the mixture being burned and the products of combustion being utilized to heat another composition containing crude oil for example, for the purpose of converting such crude oil and any other suitable hydrocarbons which may be added thereto, into a hydrocarbon mixture containing gases, vapors and solids, which may be separated to produce desired products.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described, in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claim.

Referring to the drawings,

Fig. 1 is a diagrammatic view of one form of apparatus which has been designed to use the composition in the refining of hydrocarbons.

Fig. 2 is a diagrammatic view of an apparatus designed first to use the composition in making a gas and producing steam, and for then utilizing this gas and steam in the refining of the hydrocarbons in another similar composition.

Fig. 3 is a vertical sectional view of a portion of a refining apparatus in which the mixture is converted by electric heating elements.

The apparatus employed for producing emulsified compounds of the type used in the present invention, is disclosed in the above mentioned application and comprises a closed chamber capable of withstanding relatively high super-atmospheric pressures, and provided with horizontally disposed rotatable shafts, each having along its length a multiplicity of agitating blades or arms that violently stir any fluids within the casing.

In accordance with the present invention, for example, low A. P. I. gravity hydrocarbons, such as heavy crude petroleum, oil field emulsions, still bottoms and the like, which are ordinarily unsuitable or uneconomical for refining, are introduced into the casing along with water and a suitable gas, such as air.

If the mixing process is carried on as a batch operation, a suitable quantity of compressed air or other suitable gas will be introduced into the casing and after the desired proportions of oil, aqueous liquid and gas are introduced, the shafts will be rapidly rotated to cause the blades to violently agitate the contents of the casing, so as to force the constituents of the composition to coalesce and tenaciously adhere to one another.

other. Under the microscope it has been found that the gas, such as air, due to the agitation, will disperse and form globules or bubbles, each one of which will be coated with a film of water contained within a skin of oil, and it has been found that a composition of this nature will remain in this condition indefinitely. Actually, such a composition has remained in stable condition for a period of more than a year without any noticeable stratification.

The amounts of air and water used in the composition manufacturing phase of the invention, will vary and depend on the characteristics of the oil processed.

I may also mix the constituents continuously instead of by batch treatment.

I may state however, that in operating the agitator, whether for the batch or continuous process, the oil, water and gas should be introduced in proper proportions, and in the casing should be operated upon under pressure to produce the composition which may be subsequently used as charging stock for oil refining.

In the embodiment of the invention illustrated in Fig. 1, mixtures are manufactured containing carbon dioxide in place of air, to prevent pre-ignition of the composition and such mixtures are used for fuel and refining purposes in an oil refining system. For example, still bottoms from a tank 90, and water from a tank 91 may be fed by a pump 92 to a mixer 15^a of the type shown in the application heretofore referred to and in the mixer they will be thoroughly admixed under pressure with stack gas containing CO₂ which enters by way of a pipe 93 that is joined to a compressor 94. This compressor receives the gas by way of a conduit 95 from the stack 96 of a furnace.

A composition comprising still bottoms or the like, water and gas containing CO₂, is fed from the mixer 15^a by way of a conduit 97 to a burner 98 which heats the furnace 99 in which the stack gas is generated. The burner may be of any suitable type and hot air is fed to the same through a conduit 100 which is connected to a coil 101 located in the furnace. A pressure blower 102 supplies this coil with air.

The furnace includes a boiler 103 for the generation of steam, and some of this steam if desired may be fed by a pipe 104 to the burner 98, so that a mixture of the composition and hot air under pressure, and steam if desired will be utilized in the burner 98 for fuel purposes. The steam may also be used for clearing the burner of the composition on shutting down, to prevent carbonization of the burner.

Some of the composition from the mixer 15^a is also fed through a conduit 105 to a second burner 106, and this second burner may also receive some steam from the boiler of the furnace by means of pipe 108.

The burner 106 is used in the heating of a second furnace 109, and the heat of this furnace is employed in a coil 110 to heat pressure air which flows from a second pressure blower 111 through a pipe 112 to the coil, and from the latter, through a conduit 113 which supplies the burner 106 with the hot air which supports combustion.

The products of combustion from the furnace 109 are used for oil treating or conversion in a closed chamber 114. For this purpose, the high temperature products of combustion from the furnace 109 are fed through a conduit 115 which communicates with manifolds 116 that supply

atomizers 117 with the hot products of combustion. These atomizers are supplied with a refining composition under pressure by means of branch pipes 118 which lead to the atomizers from the discharge conduit 119 of a second mixer 15^b which may be of the type shown in the parent application. This mixer receives stack gas containing CO₂ from the compressor 94 by way of tube 120, but instead of using still bottoms in this mixer, as a constituent of the composition, I prefer to use crude oil or the like. This oil is fed from a tank 121 by a pump 122 which forces the same into the oil inlet of the mixer, and water is fed by the same pump from a tank 123, to the water inlet of the mixer. By mixing other hydrocarbons with the constituents going to make up the composition, the characteristics of the resultant refined product may be varied. For example, benzol from a tank 124, or gasoline from a tank 125 may be mixed with the water fed to the mixer 15^b, and the composition made up of oil, water and gas containing CO₂, is fed under pressure from the latter through the pipes 119 and 118 to the atomizers, where it is expanded and mixed with the highly heated products of combustion from the furnace 109, and atomized into the chamber 114. If desired, steam from the pipe 108 may also be fed to the atomizers and mixed with the composition and products of combustion by means of pipes 126 and 127.

In this way, the oil treated is placed in such a condition that it may be readily converted in the chamber 114 into lighter hydrocarbons, and the gaseous mixture resulting from the conversion, will flow from the chamber 114, through a conduit 128 to condensers, coolers, separators, receivers or the like, (not shown), for the purpose of separating the liquid constituents from the gaseous constituents.

Any solids, tars, etc., which may be precipitated in the chamber 114 may be withdrawn from the latter by way of a valved pipe 129.

If desired, each atomizer 117 may be provided with a rotary agitator, not shown, and these agitators may be driven by suitable transmission means from motors 130.

The interior of the chamber 114 may be of any suitable construction, and in the form of the invention illustrated in Fig. 1, I prefer to place within the same, a perforated and corrugated collector cone 131 which acts as a baffle, and also functions to collect solids which gravitate to the bottom portion of the reaction chamber 114.

Instead of utilizing hot products of combustion to effect the thermal decomposition of the hydrocarbons; in accordance with the system illustrated in Fig. 2, the composition may be refined in a reaction chamber provided with heating elements and a catalyzer if desired. For instance, in the modification shown in Fig. 2, water and still bottoms from tanks 140, 141 may be forced by a compound pump 142, to a mixer 15^c of the type shown in the parent application and in this mixer they will be thoroughly admixed under pressure with a suitable gas such as air entering through a pipe 143. The composition from this mixer can be admixed with air or other highly heated gas, and burned in a gas producer 144, which may be employed to produce steam and gas containing CO₂. The steam from this producer is discharged by way of conduit 145, and the hot gas containing CO₂ is discharged through a pipe 146.

Water from a tank 147, and crude oil or the

like, from a tank 148, are also fed by a pump 149, into another mixer 15^a, where they are mixed with air or other gas entering through a tube 150. The composition from the latter mixer is fed through a conduit 151 to atomizers 152, and the composition is preferably injected into these atomizers. In the atomizers, the composition is expanded and is mixed with hot gas containing CO₂ from the pipe 146 and steam from the pipe 145, and the gaseous mixture entering the reaction chamber, 153 is highly heated by any suitable means, and preferably at super-atmospheric pressure to thermally decompose hydrocarbons in the composition from the mixer 15^a, and the gaseous mixture resulting from the treatment in the reaction chamber 153 is discharged by way of pipe 154, which leads the same to suitable condensers, not shown, employed in separating the light hydrocarbons, such as gasoline, from the mixture.

From the foregoing it will be understood that I have devised novel methods and apparatus for utilizing a composition of hydrocarbons, air or other gas, and an aqueous liquid, that may be used for the production of refined petroleum products.

If refined petroleum products are desired, as the end products, it will be understood, the initial procedure, so far as the production of the composition is concerned, is the same as when the composition is to be produced for fuel purposes,

that is, a composition composed of hydrocarbons, water and gas is made, and to the same is added other elements that may be desired in the end products, for example, benzol, etc., and from the reaction chamber in which the composition is processed while admixed with gas containing CO₂ and/or steam, the gaseous mixture resulting from the process is passed through any suitable means for the purpose of extracting desired products from the same.

While I have disclosed the principle of my invention, as well as my methods and apparatus in such manner that they may be readily understood by those skilled in the art, I am aware that changes may be made in the details disclosed, without departing from the spirit of the invention, as expressed in the claim.

What I claim and desire to secure by Letters Patent is:

In a process of the character described, forming an emulsified composition comprising water, hydrocarbon oil and a gas containing a high percentage of carbon dioxide, each globule of gas in the composition being coated with a film of water arranged within a film of oil, mixing said composition with hot products of combustion and thereby converting the hydrocarbon oil into lighter hydrocarbons, and separating said lighter hydrocarbons from the resulting mixture.

ROBERT H. RUSSELL.

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45	120
50	125
55	130
60	135
65	140
70	145
75	150