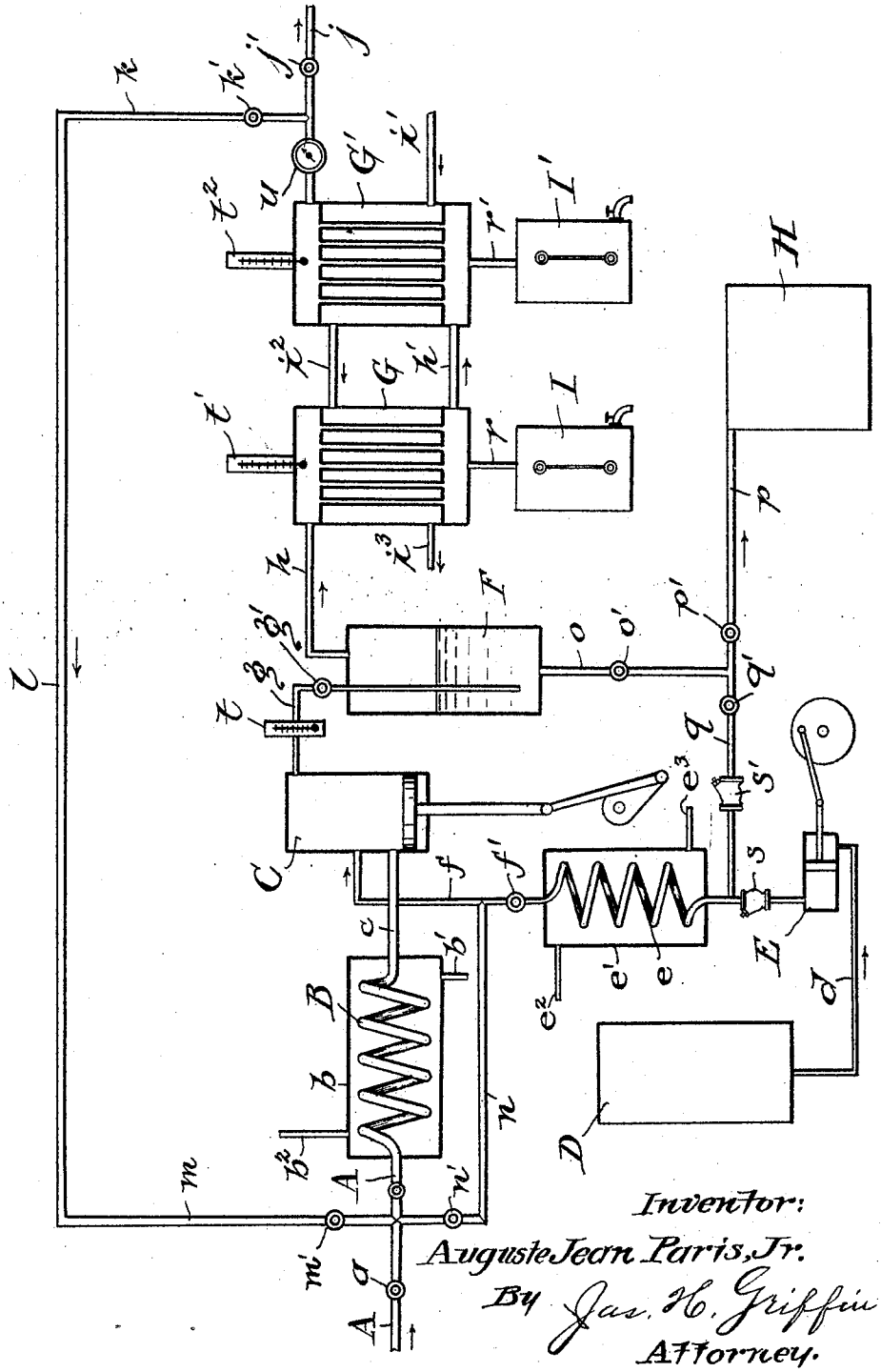
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PROCESS OF SEPARATING THE LIGHTER OILS FROM CRUDE PETROLUEM OR COAL OIL.

APPLICATION FILED DEC. 27, 1916.

1,405,155. Patented Jan. 31, 1922.



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PROCESS OF SEPARATING THE LIGHTER OILS FROM CRUDE PETROLEUM OR COAL OIL.

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Application filed December 27, 1916. Serial No. 139,124.

To all whom it may concern:

Be it known that I, AUGUSTE JEAN PARIS, JR., a citizen of the United States, residing in Bradford, county of McKean, and State of Pennsylvania, have invented a certain new and useful Process of Separating the Lighter Oils from Crude Petroleum or Coal Oil, of which the following is a specification.

This invention is a process of separating the lighter oils from crude petroleum or coal oil, but, to avoid repetition, the invention will be particularly described in connection with the treatment of crude petroleum, it being understood, however, that the process is equally applicable to the treatment of residual oils obtained from the distillation of coal, shale, etc.

The salient feature of the invention consists in compressing a suitable gas, which may or may not contain condensable hydrocarbons, and introducing into such gas, either prior to or during compression, the crude oil from which it is desired to separate the lighter oils. Either the oil or gas, or both, may be heated prior to such compression. In some cases, it may be found desirable to cool the gas prior to compression. The mixture of gas and oil vapors having been compressed, the gas absorbs or carries the lighter oils contained in the oil vapor, from which mixture the lighter oils are subsequently separated, either as a unitary product or in fractions.

If the gas employed contains condensable hydrocarbons, such hydrocarbons, if condensed under the conditions of operation, are recovered, in conjunction with said lighter oils, from the crude oil; if, however, a gas is employed which does not contain such condensable hydrocarbons, then the gas acts merely as a carrier or vehicle, and is not materially affected by the operation. The gas may be reused, i. e., circulated in a closed cycle, or fresh gas may be continuously added to the system.

No chemical change takes place in the oil under treatment by the process, said process serving, merely, to separate the lighter from the heavier oils, in lieu of ordinary distillation, which lighter oils, however, are more or less purified by the operation.

Features and advantages of the invention, other than those adverted to, will be apparent from the hereinafter detailed description, as well as obvious to those skilled in the art.

In the accompanying drawing I have illustrated one form of apparatus which I have found practical and satisfactory in practicing the process forming the subject matter of the present invention, but I desire to have it understood, however, that this apparatus is merely typical or illustrative of one type of apparatus which may be used, and that the process may be practiced in various other types of apparatus without materially changing the spirit or substance of the invention, the salient features of which are not dependent on any particular form of apparatus.

The drawing shows in elevation, more or less diagrammatically, the form of apparatus to which reference has been made.

Referring to the drawing, the pipe A, provided with valve a, is the gas inlet, said pipe A connecting with a coil B located in a casing b, into which a cooling or heating medium, as circumstances require, may be introduced through a pipe b', and drawn off through a pipe b^2, thereby providing means whereby the gas may be heated or cooled. The outlet pipe c from coil B leads to a gas compressor C.

D is a source of crude oil, the oil being drawn therefrom through pipe d by pump E and forced through coil e located in casing e', having an inlet e^2 and an outlet e^3, for a heating or cooling agent, whereby said oil, in its passage through coil e, is heated or cooled, usually heated, as circumstances require. The outlet f from coil e, provided with a valve f', leads to compressor C, thereby enabling oil to be fed to said compressor. If desired, the oil may be introduced into the compressor in the form of a spray, but, in any event, only sufficient oil is introduced therein as will be vaporized by the gas admitted to the compressor when the latter is compressed. A small excess of oil, however, will do no particular harm.

The outlet g from the compressor, provided with a valve g', leads to a separator or trap F, wherein the heavy residues or oils are dropped out from the mixture. Thereupon, the mixed oil and gas, freed from the heavy products, passes through pipe h into condenser G, and thence through pipe h' to condenser G'. The lighter oils are separated or dropped out in condenser

G, and the next lighter or lightest in condenser G'. It will be understood, of course, that as many condensers may be used in series as are found necessary to condense all the vapors carried by the gas. Condensers G and G' are cooled by a cooling agent, such as water or expanded gas, entering pipe i' of condenser G', whence it passes through pipe i^2 into condenser G, and flows off through pipe i^3.

The gas, freed from its vapors, is either allowed to escape from the system through pipe j, provided with valve j', or returned to the system through branch pipe k, provided with valve k', through return pipe l, down-take m therefrom, provided with valve m', into gas main A, or through pipe n, provided with valve n', into pipe f. In either of these latter cases, it is again introduced into compresser C through pipe c or pipe f, depending upon the course it is allowed to take.

The heavier or residuary oils which separate in tank F may be drawn through pipe o, provided with valve o', and pipe p, provided with valve p', into receiving tank H. If, however, any lighter oils are separated in tank F which it may be desirable to reuse, such oils may be again introduced into the system through pipe q, provided with valve q', to coil e, and thence to compressor C, as hereinbefore described. The lighter oils separated in condensers G and G', respectively, may be drawn off through pipes r, r', respectively, into receiving tanks I, I', respectively.

It will be understood that the system is supplied, wherever necessary, with suitable check valves, such as s and s', thermometers such as t t' t^2, and a pressure gage such as u.

From the foregoing description of the apparatus coupled with the general statement given of my invention, the operation of the apparatus will be readily understood, although it may be briefly summarized as follows.

The oil and gas having been introduced into compressor C, the mixture is compressed therein for the purpose, merely, of effecting an intimate contact of the oil and gas, whereby the latter absorbs or picks up the lighter constituents of the oil, whereupon the mixture passes into separator or trap F, wherein the heavier oils are separated. The gas, carrying the lighter oils in the form of vapor, passes through pipe h into condenser G, and thence through pipe h' into condenser G', finally passing out of the system through pipe j', or returned for reuse through pipe k. The lighter oils which are condensed in condensers G and G', are drawn into receptacles I and I', for use as required.

It will be understood that, if desired, the gas and oil vapors may be commingled or mixed before their introduction into compression cylinder C.

As hereinbefore stated, the gas may be either heated or cooled prior to its compression, and, if desired, the oil may also be preheated. The oil and gas may be preheated separately, or together.

It will be understood that the precise operations described may be varied within reasonable limits, as will be apparent to those skilled in the art, without departing from the spirit or substance of the invention, and that my invention is not limited to all of the operations described, since some of the advantages of the invention may be realized without carrying out the complete process described.

Having thus fully described the invention, what I claim is new, and desire to secure by Letters Patent, is:

1. The process of separating light oils from crude oils containing them which consists in compressing a mixture of the crude oil and a gas without cracking said oil, and thereafter separating the oil from said gas.

2. The process of separating light oils from crude oils containing them which consists in compressing a mixture of the crude oil and a gas without cracking said oil, and thereafter separating the oil, by fractional cooling, from said gas.

3. The process of separating light oils from crude oils containing them which consists in introducing the crude oil and a gas into a compression cylinder, compressing the mixture therein without cracking said oil, and thereafter separating the lighter oils absorbed by said gas during said compressing operation.

4. The process of separating light oils from crude oils containing them which consists in effecting a mixture of said oil with a gas, compressing said mixture without cracking said oil, and thereafter separating from the gas the oil absorbed thereby.

5. The process of separating light oils from crude oils containing them which consists in making a heated mixture of a gas and the oil, compressing the mixture without cracking said oil, and thereafter separating the oils absorbed by the gas by fractional refrigeration.

6. The process of separating light oils from crude oil containing them which consists in compressing a mixture of crude oil and a gas without cracking said oil, separating the heavier constituents from the crude oil and gas, and thereafter separating the lighter condensable oil constituents from the uncondensed gases.

In testimony whereof I have signed my name to this specification.

AUGUSTE JEAN PARIS, JR.