

UNITED STATES PATENT OFFICE

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PROCESS OF TREATING PETROLEUM OILS

No Drawing.

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This invention relates to a process of treating petroleum oils and more particularly the paraffin and allied heavy hydrocarbons present in crude petroleum oils.

5 An important object of this invention is to provide a process of treating paraffin-containing oils, such as crude petroleum oil, "cut oil", and the like, to remove the paraffin and allied heavy hydrocarbons therefrom or to
10 convert these heavy constituents into such form that they are readily assimilated by or miscible with the other constituents of the oil being treated.

15 Another object of the invention is to provide a process for treating the casings and oil-bearing sands of "paraffined wells" to remove the paraffin and allied hydrocarbons therefrom, thereby permitting the oil to flow freely from the oil-bearing strata into the
20 wells.

Still another object of this invention is to provide a process for removing deposits of paraffin and allied heavy hydrocarbons from pipe lines and other oil moving apparatus,
25 storing or treating equipment or apparatus.

Other objects and advantages of this invention will be apparent in the course of the following description.

30 As is well known, in many oil fields the crude petroleum oil contains a large proportion of paraffin and allied hydrocarbons. The presence of such paraffin and other heavy oily matter in the crude oil has presented a serious problem to the workers in this field in that
35 these ingredients if left in the oil so increase its viscosity that it clogs the pipe lines and apparatus used in moving, storing and treating the oil. Moreover, these heavy ingredients will often seal the interstices of oil bearing strata with the result that the oil
40 will not flow into the well or will flow but very slowly. Moreover, if the paraffin and similar heavy oily matter are present in the oil the specific gravity of the oil is materially
45 lower than if these constituents are removed. This is a distinct disadvantage since the selling price of the oil when it is run into the pipe lines depends upon the specific gravity of the oil.

50 I have discovered a process of and composi-

tion for eliminating the disadvantages above referred to and have discovered that the paraffin and similar heavy oily matter contained in the crude oil can be converted into
55 an oil of lower viscosity and higher specific gravity if treated with gas oil, treated in a manner hereinafter to be described, mixed with an alkaline oil-cleansing composition such as are now in use but preferably an oil-cleansing composition consisting of soda ash,
60 sodium bicarbonate, sodium hydroxid and a powdered form of the solid coal-tar derivative which in oil field practice is commonly called "naphtha" but which, according to proper chemical terminology, is naphthalene ($C_{10}H_8$).
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My preferred method of preparing this oil cleaning composition is as follows: Commercial gas oil, having a gravity of from
70 32° to 36° Baumé and a flash and fire point from 180° to 220° is heated to from 490° to 510° F., depending upon the crude oil employed to reduce the gravity of the gas oil to from 31.5° to 32° Baumé. During this
75 heating process any gasoline, benzine and like volatile hydrocarbons remaining in the gas oil are volatilized so that the remaining fluid is noninflammable. The temperature of the gas oil is maintained and the oil introduced into a centrifugal mixing machine into which
80 also is introduced and mixed with the gas oil soda ash, sodium bicarbonate, sodium hydroxid, and powdered so-called "naphtha" (naphthalene). The ingredients added to the gas oil in the centrifuge are preferably in
85 dry form and in the proportions of 5 parts by weight of soda ash, 5 parts by weight of sodium bicarbonate, 5 parts by weight of sodium hydroxid, and one part by weight of the powdered naphthalene. These dry ingredients are mixed with the gas oil in the proportions of preferably one gallon of gas oil to one pound of the dry mixture, or the dry ingredients may be added separately to the gas oil, in the same proportions.
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The composition thus prepared is noncorrosive and hence may be used with impunity in oil lines and apparatus. It is noninflammable so that it may be shipped without danger. It will not freeze at the lowest tem-
100

perature which may be encountered in any oil field. In fact it appears that the activity of the composition is increased by low temperatures.

5 When paraffin-containing oil is treated with this compound the paraffin and similar heavy oily matter undergo a molecular change, wherein the molecular structure is simplified, the material apparently being de-
10 polymerized with the formation of lower or less complex hydrocarbons from the higher hydrocarbons constituting these heavy constituents. The lower hydrocarbons thus formed are readily dissolved in or miscible
15 with the other oils found in the crude oil, with the result that the viscosity of the crude oil is materially reduced and the specific gravity materially raised.

20 The procedure for raising the gravity and lowering the velocity of the crude oil is preferably as follows:

The composition prepared in the manner described above may be introduced into the well or may be added to the crude oil in
25 storage tanks. In the first case, it may be poured through the casing of the well, or, if a packer is used, the compound may be poured through the tubing into the well, or the composition may be pumped through a separate
30 pipe line into the well at any desired level. If the crude oil is to be treated in storage tanks, the composition is introduced into the tank in any suitable manner and will be diffused thoroughly throughout the crude oil.
35 In such treatment, as is also the case where the composition is poured into the well, no heating is required and this feature presents an important advantage of the invention. The proportion of the composition to be em-
40 ployed will depend upon the character of the oil being treated. However, I have found that 200 barrels of crude oil may be successfully treated with 10 gallons of the composition.

45 The effectiveness of my process will be readily apparent from the fact that in one typical instance a tank of crude oil having a specific gravity of approximately 12° Baumé was treated at about 58° F., with my
50 composition and the oil was raised to a gravity of approximately 24.6° Baumé. In another test crude oil was treated according to my process and the result showed only .6 of 1% "B. S." and no water.

55 It often happens that in fields where the crude oil contains a substantial amount of paraffin and other like heavy oily matter, these heavy constituents settle to the bottom of the well or seal the oil-bearing sands or
60 other portions of the casing of the well. The well and casing may be cleaned and the heavy constituents above referred to removed by introducing the above described composition into the well. This can be accomplished in
65 any suitable manner as by pouring the com-

position directly into the well or through the tubing of the packer. The amount of the composition to be employed will depend upon the character of the well, the viscosity of the crude oil, the amount of sediment held
70 in suspension, and the proportion of heavy constituents present. However, I have found that 50 gallons of the composition is usually sufficient for cleaning a well.

I have also discovered that my process
75 and composition are particularly adapted for cleaning pipe lines which have become clogged with deposits of sediment and the above referred to heavy constituents of crude
80 oil. These lines may be cleaned by introducing my composition under pressure, as by means of pumps, through the pipe lines. The heavy constituents which have deposited
85 in the lines will be converted into lower hydrocarbons and will dissolve in or mix with the other constituents of the crude oil and in such a manner that they are readily removed from the pipe lines. Moreover, the
90 sediment which has been held in deposits in the pipe lines by the heavy constituents will be forced through and out of the lines when freed from the heavy constituents which hold them.

Another important use for my composition is in the treatment of "cut oil" contain-
95 ing paraffin and allied hydrocarbons to remove these materials from the "cut oil" and thereby prevent their loss in cases where "cut oil" is not subjected to the refining processes necessary to remove usable constituents
100 therefrom. In any case, however, the heavy constituents referred to above may be removed without the employment of heat and in a form suitable for mixing with the portions of the crude oil previously removed.
105 The importance of this use will be readily apparent.

From the foregoing it will be apparent that I have provided a particularly effective
110 process and composition for converting higher hydrocarbons such as paraffin, and allied hydrocarbons into lower hydrocarbons. It will also be readily appreciated that I have provided an efficient process and composition
115 for cleaning "paraffined wells", oil lines and the like, for changing the viscosity and specific gravity of crude oil so that it is more readily acceptable to pipe line companies and is in condition for sale at a higher
120 price, and for converting hitherto waste constituents of "cut oil" into a usable form.

While I have described in detail the preferred practice of my process and my preferred composition it is to be understood
125 that the details of procedure and the proportions of ingredients may be widely varied without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The herein described process of treat- 130

ing paraffin and allied hydrocarbons in oils and oil-bearing strata which comprises adding thereto a reagent resulting from the admixture of gas oil, soda ash, sodium bicarbonate, sodium hydroxide, and naphthalene,
5 in the proportions of approximately one gallon of gas oil, five ounces of soda ash, five ounces of sodium bicarbonate, five ounces of sodium hydroxide and one ounce of naphthalene.

10 2. The herein described process of treating crude petroleum which comprises adding thereto a reagent resulting from the admixture of gas oil of a specific gravity between 31.5° and 32° Baumé, soda ash, sodium bicarbonate, sodium hydroxide and
15 naphthalene, in the proportions of approximately one gallon of gas oil, five ounces of soda ash, five ounces of sodium bicarbonate, five ounces of sodium hydroxide and one
20 ounce of naphthalene.

In testimony whereof I affix my signature.

FRANK F. GORMAN.