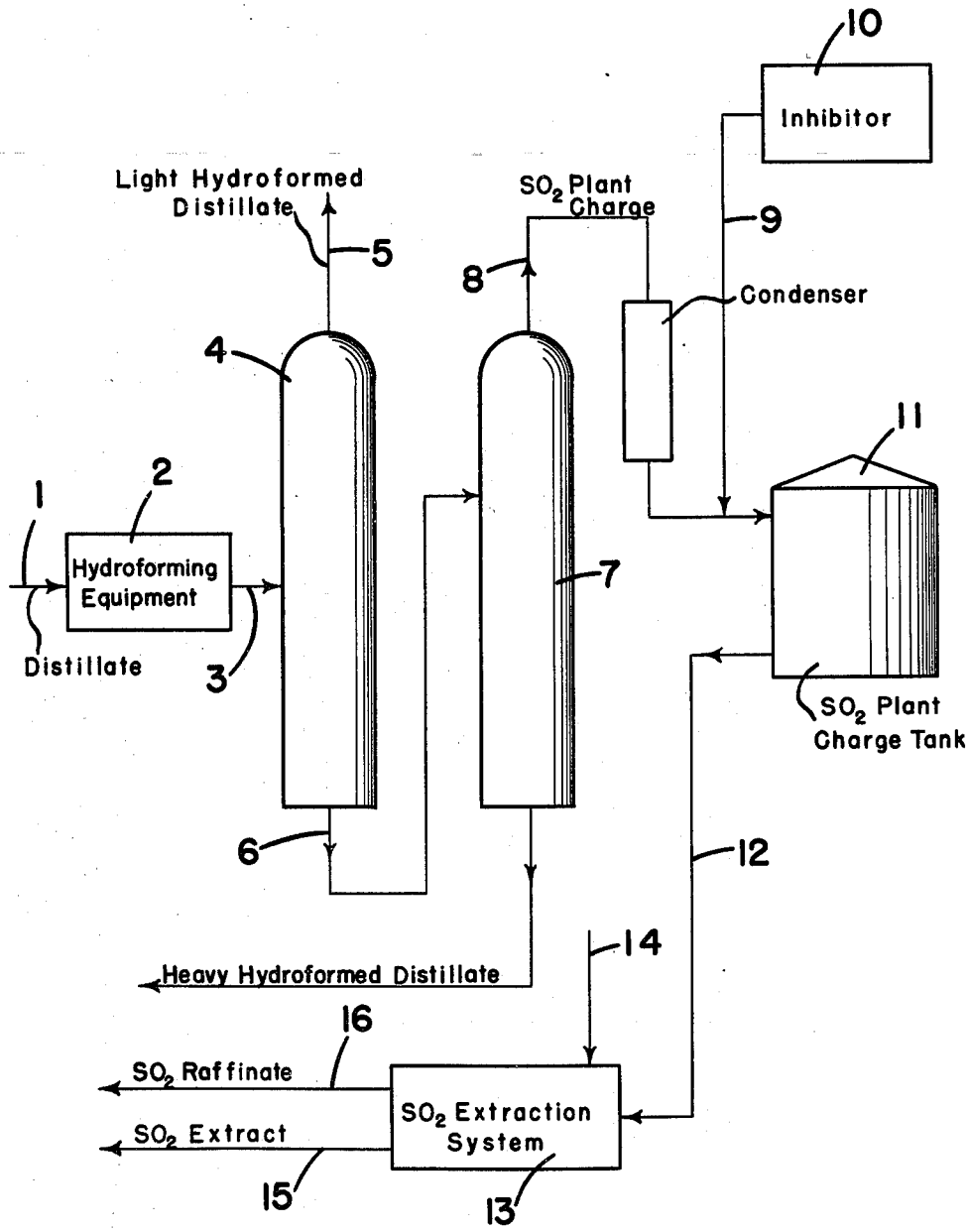
May 23, 1944. R. E. TANNICH 2,349,473

EXTRACTION WITH SULPHUR DIOXIDE

Filed Sept. 14, 1942



Richard E. Tannich, INVENTOR.

BY P. J. Whelan

ATTORNEY

Patented May 23, 1944

2,349,473

UNITED STATES PATENT OFFICE

2,349,473

EXTRACTION WITH SULPHUR DIOXIDE

Richard E. Tannich, Baytown, Tex., assignor to Standard Oil Development Company, a corporation of Delaware

Application September 14, 1942, Serial No. 458,311

4 Claims. (Cl. 196—37)

The present invention is directed to the SO_2 extraction of petroleum fractions containing olefins.

The extraction of petroleum fractions with SO_2 is a well known procedure in refinery operations. For the most part, it has been practiced on a commercial basis on virgin distillates. Attempts to apply it to cracked distillates have led to operating difficulties, such as coking of heat exchangers and of other equipment which is heated in the course of the operation to separate SO_2 from the extract and the raffinate. This trouble has been particularly pronounced in operations in which hydroformed naphthas have been employed as the feed stock for the extraction.

It has now been found that the aforesaid difficulty can be avoided if an oxidation inhibitor is incorporated in the hydrocarbon fraction before it is contacted with the sulphur dioxide and maintained in the mixture while the SO_2 is in contact with the hydrocarbons. It is preferable to add the inhibitor to the hydrocarbon fraction immediately after the treatment which results in the formation of olefins and before the fraction has an opportunity to come into contact with air. In the ordinary operation, it is advantageous to subject the fraction immediately after the conversion treatment which produced the olefins to a distillation to remove the light ends, thereby automatically eliminating any oxygen that may have been picked up by the fraction. Then the inhibitor is added to the remainder.

The inhibitor to be employed may be any one of the commonly known oxidation inhibitors which are soluble in petroleum. A suitable inhibitor is isobutyl-p-amino phenol. This inhibitor may be employed in amounts varying from about 0.05 to 0.50 lbs. per 1,000 gals. of petroleum. Greater amounts may be employed, but are not required. Amounts that render the cost undesirably high are not attractive for the additional reason that they are ineffective. Other inhibitors of the phenolic or amino type may be employed. A particularly suitable class of inhibitors are those which are known in the art as gum inhibitors in motor fuels. A preferred type of inhibitor is a cut of petroleum phenols obtained by extracting heavy cracked distillates boiling in the range of about 250°–700° F. with 30°–50° Baumé sodium hydroxide solution and acidifying the extract to release the phenols. These petroleum phenols are effective in quantities as low as 0.25 lb./1,000 gals. of petroleum fraction.

One procedure which may be followed in the practice of the present invention is illustrated in the accompanying drawing, in which the single figure is a front elevation, in diagrammatic form, of a plant suitable for such procedure.

Referring to the drawing in detail, numeral 1 designates a feed line for introducing a petroleum fraction, such as virgin naphtha, into conversion unit 2 in which is effected an operation such as cracking, hydroforming, cyclization, or the like, in which hydrogen is split off from hydrocarbons. The effluent from this unit is conducted, by line 3, into a distillation unit 4 in which light ends, including any oxygen which may be contained in the distillate, are taken off overhead through line 5. The residue is drawn off from the bottom through line 6 and discharged into a second distillation unit 7, from the top of which is withdrawn a fraction of the desired boiling range for extraction with SO_2 through line 8. Connected to line 8 is a branch line 9 for introducing regulated amounts of a selected inhibitor from a storage tank 10 into the hydrocarbon stock, which is then fed into a storage tank 11.

The feed stock from the storage tank is conducted, by line 12, into an SO_2 extraction unit 13, in which is a feed line 14 for SO_2, an exit line 15 for SO_2 extract, and an exit line 16 for SO_2 raffinate. The extract is then conducted into a system for the separation of the SO_2 from the extract, which includes heat exchangers and other equipment which is maintained at an elevated temperature. It is in this heated recovery equipment that difficulty was previously encountered in the form of coke deposition. This coke deposition has been considerably minimized, in fact, almost to the point of complete prevention, by the use of the inhibitor in the manner described above.

The nature and objects of the present invention having been thus described and illustrated, what is claimed as new and useful and is desired to be secured by Letters Patent is:

1. In a method in which a petroleum fraction containing olefins is extracted with SO_2, the steps of introducing into said petroleum fraction prior to its contact with SO_2 an oxidation inhibitor and maintaining said inhibitor in the mixture until the SO_2 is separated from the hydrocarbons.

2. In a method in which a petroleum naphtha is subjected to a thermal conversion during which olefins are formed, and then to extraction with sulphur dioxide, the steps of introducing into

said naphtha immediately after said conversion an oxidation inhibitor, and maintaining said inhibitor in said naphtha until the extraction with SO_2 has been completed.

3. In a method in which a petroleum naphtha is subjected to a thermal conversion and then to an extraction with SO_2, the steps of subjecting the fraction immediately after said conversion to a fractionation in which light ends, together with any oxygen which may be present, are removed, and then adding an oxidation inhibitor to the residual naphtha prior to the extraction thereof with SO_2 whereby said inhibitor is present at all times while said naphtha is in contact with SO_2.

4. A method according to claim 1 in which the inhibitor employed is a petroleum phenol.

RICHARD E. TANNICH.