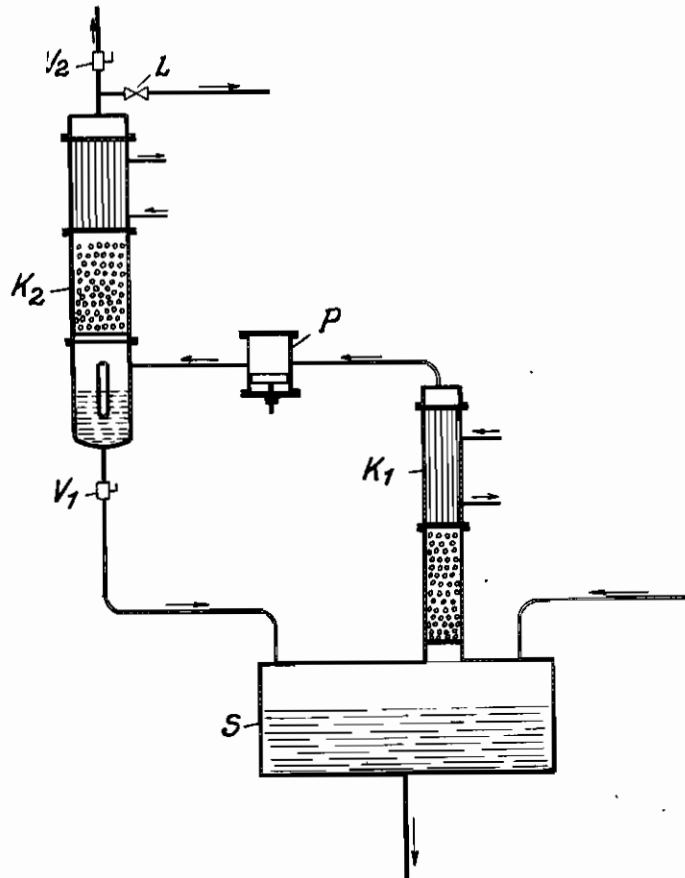


PUBLISHED  
MAY 18, 1943.  
BY A. P. C.

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OIL REFINING PLANTS WHICH OPERATE WITH  
LIQUEFIED, AT NORMAL TEMPERATURE  
GASEOUS SOLVENTS  
Filed Dec. 9, 1940

Serial No.  
369,332



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## ALIEN PROPERTY CUSTODIAN

### PROCESS FOR THE REMOVAL OF GASES FROM MINERAL OIL REFINING PLANTS WHICH OPERATE WITH LIQUEFIED, AT NORMAL TEMPERATURE GASEOUS SOL- VENTS

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vested in the Alien Property Custodian

Application filed December 9, 1940

It is known to refine mineral oils, tars and the like by extracting and/or dewaxing and/or de-asphalting them with the aid of liquefied, at normal temperature gaseous solvents as e. g. sulfur dioxide or propane, or with the aid of mix-  
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tures containing solvents with a high vapour pressure. The solvents are recovered from the solutions resulting from the above treatments by evaporation and condensation of the vapours under pressure.

During the operation of such plants gases such as nitrogen, air or also low molecular hydrocarbon vapours get continuously into the solvent, for instance with the raw oil or by diffusion through valve packings; since they are not condensed under the prevailing conditions they accumulate in the condenser and condenser pressure collector, respectively. Also by the controlling instruments which must be installed in such plants and the operation of which is effected by  
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gases, e. g. air, nitrogen or carbon dioxide, the latter ones get into the circulating solvent. The not condensed gases increase the pressure of the condenser system and, therefore, disturb the evaporation of the solvent and increase the load of the compressors.

Since the gases are mixed with solvent vapours, a relatively great amount of solvent gets lost when the gases are blown off from the collector.

The present invention suggests a method for the automatic removal of these gases from mineral oil refining plants without any substantial loss of solvent.

According to the invention the gases mixed with solvent vapours are continuously taken off from the collector, passed over a cooler, compressed to a pressure 5-30 atms. above the condenser pressure and subsequently cooled to a temperature at which the solvent contained in the gases is condensed to a large extent. The gases freed from  
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solvent escape to the open air over a regulating valve which keeps the pressure of the high pressure cooler constant while the pressure condensate is led back into the solvent collector.

According to the invention, the solvent collector is fitted with a de-aeration system consisting of two coolers and the compressor between which sucks the gas-solvent-mixture off from the pre-cooler and presses it into the high pressure cooler.

The two cooling systems are preferably designed as fractionating columns, the lower part of which is packed e. g. with "Raschig"-rings and the upper part is equipped with a cooler.

When liquid solvent at lower temperatures is

applied or obtained in refining plants, e. g. in plants in which wax is precipitated at low temperatures with the aid of SO<sub>2</sub> and auxiliary solvents such as benzol, or with the aid of propane or such-like, or in which light oil is extracted with SO<sub>2</sub> at extremely low temperatures (to -60° C), it will be advisable to cool the cooling systems in the columns by means of the cold solvent. The cooling may also be effected by injecting liquid solvent from the collector into the cooling system and evaporating it preferably by means of the same compressors which serve for the sucking off and compression of the low pressure vapours from the plant in order to recover the  
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solvent.

The de-aeration compressor is preferably operated with constant speed and acts, therefore, also as feed pump for the second cooling system. The latter is to be sized for such an amount of solvent that the solvent vapours in the cooling system are also entirely condensed when the compressor occasionally draws off completely pure solvent vapours.

In a plant operating e. g. with liquid sulfur dioxide the gases are sucked off from the collector at 5 atms. and are submitted in the second cooling system to a pressure of 10 to 20 atms. and temperatures from -10° to -30° C. Propane may be withdrawn at about 10 atms. and treated in the second cooling system at about 40 atms. and -30° C.

Since the uncondensable gases are kept under elevated pressure they are advantageously used for the operation of the above mentioned measuring and regulating instruments. Such instruments are, for instance, necessary for the operation with solvent mixtures in order to adjust the mixing ratio of the mixture, e. g. of sulfur dioxide and benzol. The gases to be employed  
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for the operation of these instruments are branched off entirely or partly behind the second cooling system and, having passed the instruments, are released to the open air, or in special cases they return to the condenser and the condenser pressure collector, respectively. That is why not condensable gases also circulate through the de-aeration device when no air from outside enters the plant.

A suitable equipment showing the various phases of the process according to the invention is illustrated in the enclosed drawing, designed for operation with liquid SO<sub>2</sub> as solvent.

The collector may be called S. On top of the collector is mounted a column K<sub>1</sub> half of which is packed with "Raschig" rings or the like.

The upper part of the column is equipped with a tubular cooler with the aid of which part of the sulfur dioxide contained in the gases is condensed and led back to collector S.

The gases from column K<sub>1</sub> are compressed in compressor P to approximately 10 atms. or higher and conducted to the second column K<sub>2</sub> the middle part of which is packed with "Raschig" rings. With the aid of a tube system the upper part of column K<sub>2</sub> is kept at a temperature at which the sulfur dioxide contained in the gases is condensed to a large extent. The condensate flows into the lowest part of column K<sub>2</sub> from where it is withdrawn over valve V<sub>1</sub> and led back to collector S. Valve V<sub>1</sub> can be adjusted automatically by an overflow device (not illustrated) installed in the bottom of column K<sub>2</sub>.

The incondensable gases practically free from sulfur dioxide leave cooler K<sub>2</sub> through valve V<sub>2</sub> or partly through valve L in order to be conducted as pressure gas to measuring instruments not shown on the drawing.

When the compressor P draws off pure sulfur dioxide from cooler K<sub>1</sub> valve V<sub>2</sub> closes automatically. Valve V<sub>2</sub> also closes automatically if the mixture drawn off by the compressor contains just such an amount of not condensable gases as is necessitated for the operation of the measuring instruments and which is passed through valve L.

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