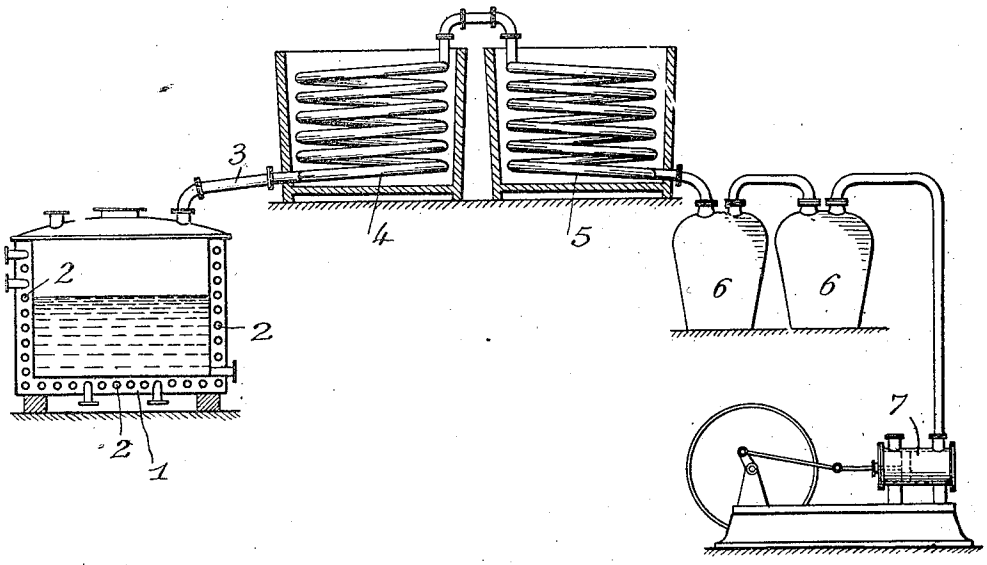
Nov. 20, 1923. 1,474,647

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PROCESS FOR CONCENTRATING AQUEOUS NITRIC ACID BY MEANS OF SULFURIC ACID

Filed May 13, 1922



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Patented Nov. 20, 1923. 1,474,647

UNITED STATES PATENT OFFICE.

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PROCESS FOR CONCENTRATING AQUEOUS NITRIC ACID BY MEANS OF SULPHURIC ACID.

Application filed May 13, 1922. Serial No. 560,725.

To all whom it may concern:

Be it known that I, WERNER SIEBERT, a citizen of the Republic of Germany, residing at Laufenburg, Aargau, Switzerland, have invented a certain new and useful Improvement in a Process for Concentrating Aqueous Nitric Acid by Means of Sulphuric Acid, of which the following is a specification, reference being had therein to the accompanying drawing.

The invention consists in an improved process for concentrating aqueous nitric acid by means of sulphuric acid.

Dilute nitric acid obtained by the absorption of nitrous fumes has been concentrated with the aid of sulphuric acid on a large scale. Because of the importance of the process quite a number of different methods have been tried in which a mixture of dilute nitric acid and sulphuric acid is treated with steam and inert gases in towers or columns whereby the nitric acid fumes are deprived of water by the sulphuric acid.

The addition of steam increases, however, the consumption of sulphuric acid per unit of HNO_3, which makes it necessary to install much larger apparatus for reconcentrating the sulphuric acid. In order to avoid the introduction of steam into the acid mixture it has already been suggested to distill the nitric acid out of the mixture in iron pans or receptacles externally heated.

This common process presents the great disadvantage that the concentration of the nitric acid diminishes constantly from the beginning of the process to the end.

At the beginning of the distillation it is, for example, possible to produce HNO_3 of a concentration of 95%, but towards the end of the process the concentration drops to about 70% which makes it necessary to repeat the distillation.

Now in the present invention it has been found that it is possible to recover the whole amount of the introduced HNO_3 as acid of a concentration of from 97 to 99% by distilling the acid under vacuum in a sort of a cast iron boiler or retort and by inserting a dephlegmator between the distillation retort and the condensing apparatus; this dephlegmator being kept at a temperature of about 60°C. In the dephlegmator the nitric acid fumes coming from the retort are separated in such a manner that only fumes of a concentration of 97% and above pass further on, while the weak acid flows back into the retort. The application of the process under vacuum allows retorts to be employed which have coils or the like cast in the body of the retort which coils can be heated with steam at a pressure of 5 to 8 atmospheres. The novel process has the great advantage over the hitherto known processes that the whole amount of nitric acid is obtained in a highly concentrated form with the smallest quantity of sulphuric acid.

Thus less sulphuric acid is required in this process than when introducing steam directly into the acid mixture, and at the same time the condensation of the nitrous fumes is not impeded by inert gases.

In the accompanying drawing an example of an installation for carrying the improved process according to the invention into effect is diagrammatically illustrated.

In this drawing 1 denotes the cast iron boiler or retort provided with coils 2 which may be cast into the wall of the retort. To these coils 2 steam is supplied for heating the mixture of dilute nitric acid and sulphuric acid contained in the retort 1. For the purpose of increasing the temperature the steam may be supplied at a temperature of 5 to 8 atmospheres. The nitric acid fumes emanating from the heated liquid mixture in retort 1 are led through the conduit 3 into a dephlegmator 4 in which the separation of the nitric acid fumes according to the concentration takes place. Fumes of a concentration of 97% and above pass further on into the condenser 5 and the liquid nitric acid is collected in receptacles 6.

The nitric acid fumes having a concentration of below 97% cannot pass the dephlegmator and are returned into the boiler 1 where they are again subjected to the distilling action. 7 denotes a vacuum pump for maintaining a vacuum in the whole system.

I claim:

1. The process for concentrating aqueous nitric acid by means of sulphuric acid which consists in distilling a mixture of dilute nitric acid and sulphuric acid under vacuum, dephlegmating the nitric acid fumes, returning for further distillation the fumes

which have low concentration, and condensing the fumes which have high concentration.

2. An apparatus for concentrating aqueous nitric acid by means of sulphuric acid, comprising a retort for distilling nitric acid fumes from a mixture of aqueous nitric acid and sulphuric acid, a condenser, a dephlegmator inserted between the retort and the condenser to return the fumes of low concentration to the retort and deliver to the condenser the fumes of high concentration, and means to maintain a vacuum in the apparatus.

In testimony whereof I affix my signature.

DR. WERNER SIEBERT.