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METHOD OF RECOVERING AMMONIA FROM COAL GASES AND THE LIKE.

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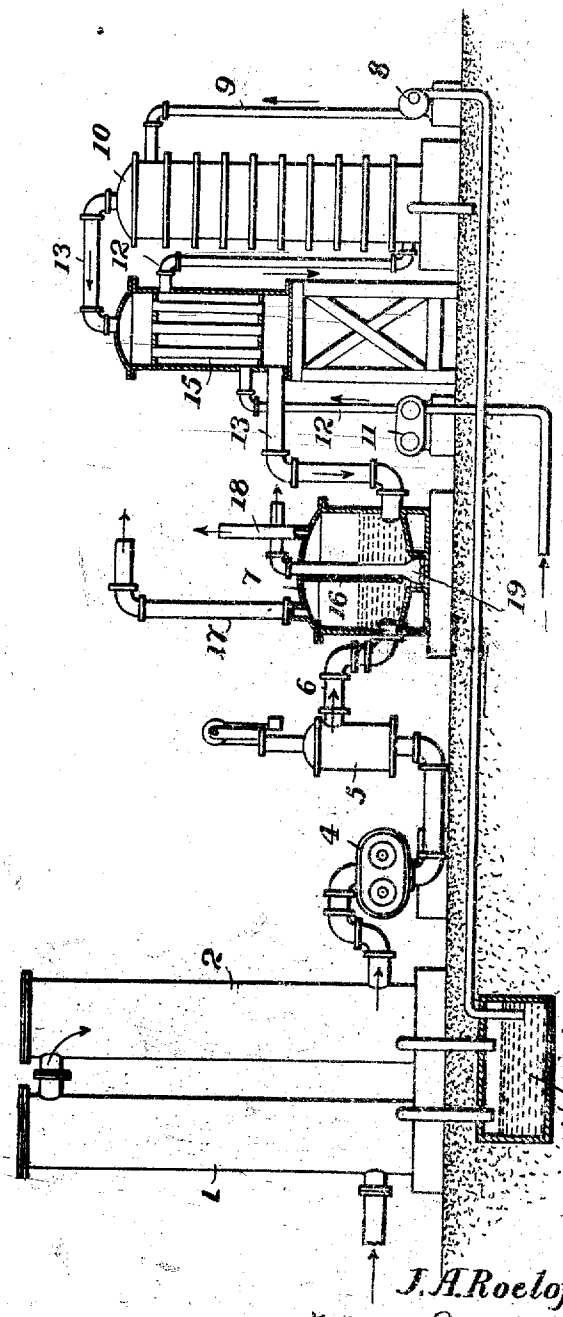

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METHOD OF RECOVERING AMMONIA FROM COAL-GASES AND THE LIKE.

969,907. Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed April 19, 1910. Serial No. 556,402.

To all whom it may concern:

Be it known that I, JAN ADOLF ROELOFSEN, a subject of the King of Great Britain, residing at Southcote, Cambridge Road, Middlesbrough, in the county of York, England, have invented certain new and useful Improvements in Methods of Recovering Ammonia from Coal-Gases and the Like, of which the following is a specification.

One of the objects of this invention is to recover ammonia from gases as a salt, preferably sulfate, by means of a smaller and more economical installation than in the prior processes previously known, and without the troublesome reheating of the gases of carbonization which, if these gases are subsequently treated for the extraction of benzol require to be cooled afterward; further, to prevent the contamination of the marketable ammonium salt by tar and the like, and the contamination of the gases of carbonization, from which the tar and ammonia have been separated, by obnoxious gaseous ingredients, which render these gases inapplicable for illuminating or power purposes, and lower their calorific value unless purified by expensive processes.

A further object is to greatly reduce the amount of obnoxious effluent produced, and finally, to effect economies by using hot air, hot products of combustion, or other hot neutral gases, which do not permanently combine with ammonia, in place of steam, in the operation of the ammonia still, and to maintain the concentration of the acid solution of the ammonium salts by superheating the vapors obtained from the ammonia still before they enter the acid solution.

My invention will be understood from the following description, and its scope will be particularly pointed out in the claims.

For the purpose of illustrating one arrangement of gas pipes, apparatus and connections by which my invention may be carried out, reference may be had to the accompanying drawing.

The gases of carbonization, coming from coke ovens, retorts or the like, are completely cooled in the coolers 1 and 2, thereby condensing the tarry vapors and also the aqueous vapor containing most of the ammoniacal and other fixed salts, as well as some free ammonia; these oily and aqueous condensates are collected and separated by gravity in tank 3. The gases of carbonization, after having thus been cooled, pass through a gas-blower 4 and a Pélouze tar-extractor 5, which separates the residual tarry vapor, and without being reheated, are conducted through pipe 6 into a lead-lined saturator 7.

The condensed ammonical liquor from tank 3 is delivered, by means of pump 8, through pipe 9 into ammonia still 10, an alkali, such as lime, being also introduced, and into which still, the blower 11 forces, through pipe 12 and superheater 15, a current of hot air, hot products of combustion, or any other hot neutral gases which do not permanently combine with ammonia. The ammonia thus liberated passes through pipe 13 and superheater 15 into saturator 7.

The saturator 7 is divided into two compartments by means of the diaphragm 16, which dips into the acid solution of ammonium salts contained in the saturator 7. The gases of carbonization enter into one of these compartments through the perforated end of pipe 6, pass up through the acid solution, and leave the saturator, after having thus been freed from residual ammonia, by means of pipe 17. The vapors from the ammonia still 10, enter the other compartment of the saturator 7, through the perforated end of pipe 13. The contained ammonia is thereby absorbed, while the aqueous vapor and noxious gases which may contain hydrogen sulfid and other gaseous sulfur compounds, hydrocyanic acid, carbonic acid and traces of hydrochloric acid, pass out of the saturator through pipe 18; the effect of the superheating of the vapors coming from the ammonia still 10 being to prevent condensation of water in the saturator 7, and thereby a lowering of the concentration of the acid solution which would prevent the ammonium salt from separating in the solid state.

The ammonium salt, preferably ammonium sulfate, is removed from the saturator 7 by means of the ejector 19.

The saturator construction disclosed herein forms the subject-matter of my copending application, Serial No. 556,401.

I claim:—

1. The method of recovering ammonium salts from gases of carbonization, which comprises cooling the gases to separate there-

from the tarry matters and condensing the aqueous vapor containing most of the combined ammoniacal products and a portion of the free ammonia, distilling said ammoniacal condensate, simultaneously introducing said gases and the vapors of distillation independently into a single acid solution of ammonium salts, and separately leading off the gases of carbonization and the noxious gaseous components of the vapors of distillation emerging from said solution.

2. The method of recovering ammonium salts from gases of carbonization, which comprises cooling the gases to separate therefrom the tarry matters and condensing the aqueous vapor containing most of the fixed ammoniacal compounds and a portion of the volatile ammoniacal compounds, introducing hot neutral gases which do not permanently combine with ammonia, into a mixture of the ammoniacal condensate obtained in the cooling of the gases, with an alkali, for the purpose of liberating the ammonia therefrom, and conducting the resulting ammoniacal gas mixture to a saturation bath.

3. The method of recovering ammonium salts from gases of carbonization, which comprises cooling the gases to separate therefrom an ammoniacal condensate comprising the tarry matters and condensing the aqueous vapor containing most of the fixed ammoniacal compounds and a portion of the volatile ammoniacal compounds, introducing hot neutral gases which do not permanently combine with ammonia, into a mixture of said ammoniacal condensate with an alkali, for the purpose of liberating the ammonia therefrom, simultaneously introducing said gases and the vapors of distillation independently into a single acid solution of ammonium salts, and separately leading off the gases of carbonization and the noxious gaseous components of the vapors of distillation emerging from said solution.

4. The method of recovering ammonium salts from gases which comprises the superheating of the vapors obtained from the distillation of ammoniacal condensate by indirect application of heat from hot neutral gases, and conducting the superheated vapors thus formed into an acid solution of ammonium salts for the purpose of preventing condensation of said vapors and maintaining the concentration of said acid solution so that solid ammonium salts will separate therefrom.

In testimony whereof I affix my signature in presence of two witnesses.

JAN ADOLF ROELOFSEN.

Witnesses:

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