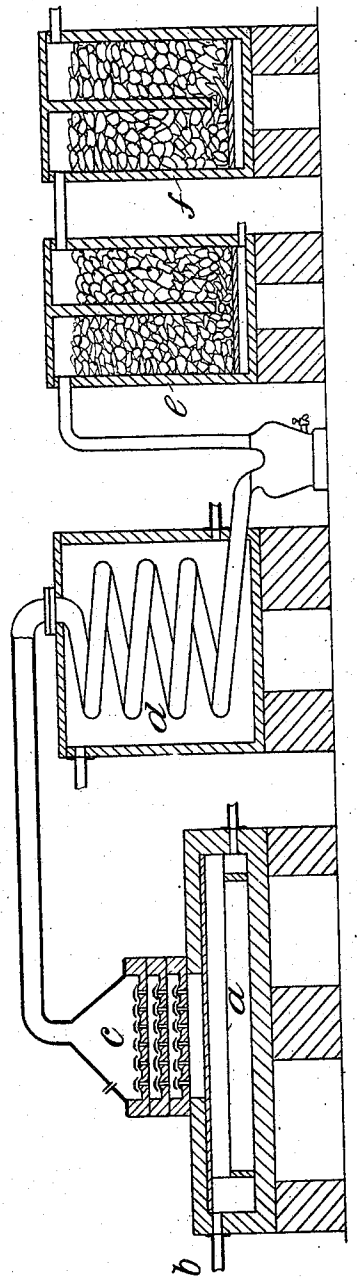
No. 854,928. PATENTED MAY 28, 1907.

E. COLLETT.

METHOD OF CONCENTRATING NITRIC ACID.

APPLICATION FILED AUG. 10, 1905.



Witnesses.
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METHOD OF CONCENTRATING NITRIC ACID.

No. 854,928. Specification of Letters Patent. Patented May 28, 1907.

Application filed August 10, 1905. Serial No. 273,618.

To all whom it may concern:

Be it known that I, EMIL COLLETT, a subject of the Kingdom of Norway, residing at Christiania, Norway, have invented certain new and useful Improvements in Methods of Concentrating Nitric Acid; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the method of concentration of nitric acid.

The usual method of concentrating nitric acid of 40%, by which one part of acid is mixed with three or four parts of concentrated sulfuric acid and then distilled, is combined with great costs on the maintenance of expensive apparatus; besides this it requires too great a quantity of fuel, as well for the concentration of the nitric acid as especially for the concentration of the sulfuric acid, which was diluted by this process. Consequently efforts have already for a long time been made to produce new and more economical means of the concentration.

I have now succeeded in finding a method by which the concentration of the acid may be carried out with far less expenses, than by the methods earlier known. By this method the concentration is effected by an air—or gas—current, which by aid of suitable apparatus is brought into an intimate contact with the acid, so that the water contained therein is evaporated. For this purpose the acid is preferably led into a non-corrosive vessel, which is thus arranged, that the hot air—or gas—current passes the surface of the acid and partly is forced into it. Hereby the water contained in the acid is evaporated. Some of the acid itself, is, however, also evaporated, and in order to regain this acid there is, above the non-corrosive vessel, placed a column apparatus of non-corrosive material, which is fed from above with the diluted nitric acid. Here the hot vapors and air from the vessel containing the acid are forced through the diluted and cold acid, which is flowing in, whereby the acid vapors are condensed and the diluted acid exposed to a previous heating and partly also to a concentration. After their passage through the column apparatus the vapors continue their way through a cooling tube or serpent, whereby some diluted acid is acquired as a distillate. Then the air current passes through a vessel filled with bits of non-corrosive material, where most of the acid contained in the vapors is retained. If at last the air current is led through a vessel filled with limestone and lime, any loss of acid may be avoided, the nitric acid combining with the lime to calcium nitrate, which may be utilized. In this way the chief quantity of nitric acid will be concentrated up to about 60%, while the distillate containing about 10% of the original quantity of nitric acid may be profitably utilized.

The annexed drawing is a diagrammatic view of a preferable arrangement of apparatus for carrying out the above described process.

a is the non-corrosive vessel, in which the concentration of the acid is effected by aid of the hot air—or gas—current, which is led in at *b* and by suitably arranged walls is driven forward and backward over the surface of the acid and then passes out through the column apparatus *c* arranged above the concentration vessel. The air current is then led on through the cooling apparatus *d*, where the greater part of the vapor and the acid contained in the same is concentrated; then it passes through a tower *e*, filled with pieces of non-corrosive material, as for instance, coke, chamottestone, etc., and at last through the tower *f*, which is filled with limestone and lime.

Claims.

1. The method of concentrating nitric acid which includes exposing the dilute acid to the influence of a current of a hot gaseous medium free from acid and bringing the so obtained mixture of gases and vapors into contact with a cold aqueous liquid for the purpose of condensing the vapors.

2. The method of concentrating nitric acid, which includes exposing the dilute acid to the influence of a current of a hot gaseous medium free from acid, and bringing the so-obtained mixture of gases and vapors into contact with a cold stream of diluted nitric acid for the purpose of condensing the major part of the vapors and pre-heating the diluted nitric acid.

3. The method of concentrating nitric acid, which includes exposing the acid to the influence of a current of a hot gaseous medium, bringing the so obtained mixture of

gases and vapors into contact with a cold stream of diluted nitric acid for the purpose of condensing the major portion of the vapors and preheating the diluted nitric acid, and bringing the mixture of gases and vapors into contact with cold bodies for condensation of a further quantity of nitric acid vapors.

4. The method of concentrating nitric acid, which includes exposing the acid to the influence of a current of a hot gaseous medium, bringing the resulting mixture of gases and vapors into contact with a cold stream of diluted nitric acid to condense the major part of the vapors and preheat the diluted nitric acid, then bringing the mixture of gases and vapors into contact with cold bodies to condense a further quantity of acid, and finally into contact with a substance capable of forming a nitrate with nitric acid.

5. The method of concentrating nitric acid, which consists in exposing the acid to the influence of hot air, bringing the resulting mixture of gases and vapors into contact with cold diluted nitric acid to condense the major portion of the vapors and preheat the diluted acid, then bringing the mixture of gas and vapors into contact with cold surfaces to condense a further quantity of acid and finally into contact with limestone.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

EMIL COLLETT.

Witnesses:
JOH. RIIS,
CHR. BLICH.