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PROCESS OF OXIDIZING NITROGEN OF AIR BY MEANS OF ELECTRIC DISCHARGES.

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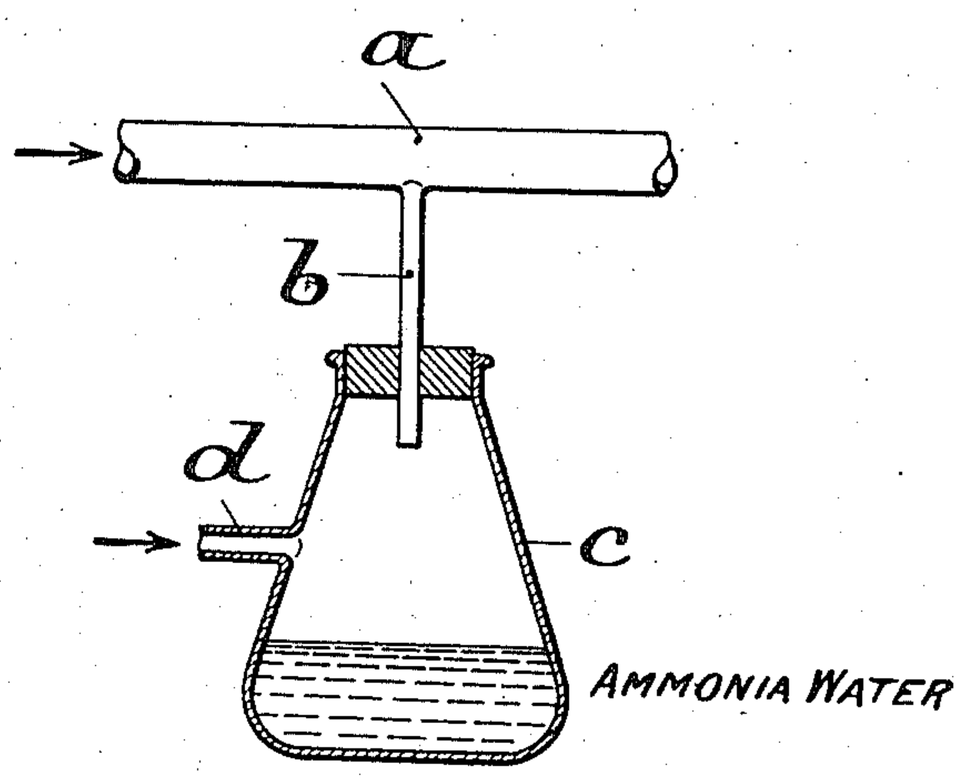

WITNESSES

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PROCESS OF OXIDIZING NITROGEN OF AIR BY MEANS OF ELECTRIC DISCHARGES.

984,925. Specification of Letters Patent. Patented Feb. 21, 1911.

Application filed March 25, 1910. Serial No. 551,511.

To all whom it may concern:

Be it known that I, KARL KAISER, Ph. D., professor of physiology, a subject of the German Emperor, residing at 9 Xantenerstrasse, Wilmersdorf, near Berlin, Germany, have invented certain new and useful Improvements in Processes of Oxidizing the Nitrogen of the Air by Means of Electric Discharges; 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.

This invention relates to improvements in a process of oxidizing the nitrogen of the air by means of electric discharges.

As is well known in the art gaseous ammonia when mixed with air and subjected to the influence of dark electrical discharges is partly oxidized into ammonium nitrate. It is also known in the art, that gaseous ammonia when subjected to the action of electric sparks or flames is decomposed into its constituents, that is into nitrogen and hydrogen. (See for example L. Spiegel, *Der Stickstoff und Seine Wichtigsten Verbindungen*, Friedrich Vieweg & Sohn, Braunschweig, Germany, page 398, first paragraph.)

The present invention is based on the discovery, that when oxidizing the nitrogen of the air by means of electric arc or flame discharges the output in nitrogen oxid or nitric acid is considerably increased, if small amounts of gaseous ammonia are added to the air or to the mixtures of nitrogen and oxygen. It has been found, that the gaseous ammonia does not act in the process in such a way as to bind the products of the oxidation of the nitrogen, and to prevent a state of equilibrium. Vapors of ammonium nitrite or nitrate are not at all produced in the process; only when the electric current is broken small amounts of ammonium nitrite are produced as a matter of course from the dioxid of nitrogen produced in the process, the ammonia and the vapors of the water, and the said amounts of ammonium nitrite are indicated by thin gray vapors formed in the brown dioxid of nitrogen. In this respect the new process is essentially different from the old process of producing ammonium nitrate which consists in subjecting, to the action of a dark electric discharge, a mixture of dried or ozonized air and an amount of dried gaseous ammonia which is sufficient to bind the oxids of nitrogen produced in the process.

For putting the improved process into effect an alternating current of high tension is discharged, either in the form of a flame or of a current of sparks, within a suitable receptacle; for example within a tube, and a current of atmospheric air or a mixture of nitrogen and oxygen containing a small amount of gaseous ammonia is forced through the said receptacle at the proper speed. In the preferred form of the apparatus small amounts of gaseous ammonia are drawn in by the current of air by means of an apparatus which is similar to an injector.

In order that the invention may more readily be understood, an example of an apparatus by means of which the gaseous ammonia is added to the current of air is illustrated in the accompanying drawing, in which a vertical cross-section of the apparatus is shown.

As shown in the drawing, from a tube *a* through which the current of air passes a narrow tube *b* is branched off which communicates with a receptacle *c* containing water and ammonia. The receptacle *c* is provided with a tube *d* through which the air is admitted. In operation, the air flowing through the tube *a* draws in additional air through the tube *d* and the receptacle *c*, and within the latter the additional air takes up small amounts of gaseous ammonia.

I claim:

1. The herein described process of oxidizing nitrogen, which consists in adding a small amount of gaseous ammonia to a mixture comprising oxygen and nitrogen, and subjecting the mixture thus produced to the action of an electric discharge.

2. The herein described process of oxidizing nitrogen, which consists in adding a small amount of gaseous ammonia to a mixture comprising atmospheric air, and subjecting the mixture thus produced to the action of an electric discharge.

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

KARL KAISER.

Witnesses:

HENRY HASPER,

WOLDEMAR HAUPT.