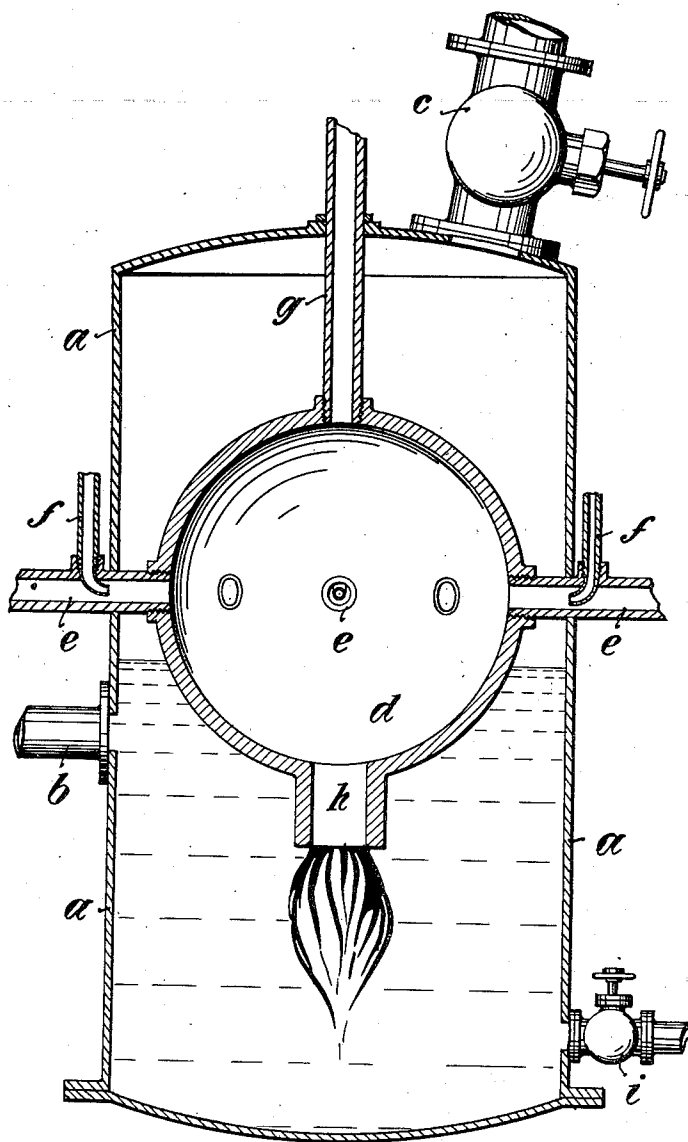


No. 834,257.

PATENTED OCT. 30, 1906.

O. H. U. BRÜNLER.
APPARATUS FOR MAKING NITRIC ACID.
APPLICATION FILED MAR. 13, 1906.



Witnesses:

Wilhelm Brase
Willi Casper

Inventor
Oscar Heinrich Ulrich Brünler
per Gerson & Sachse
Attorneys

UNITED STATES PATENT OFFICE.

OSCAR HEINRICH ULRICH BRÜNLER, OF LEIPSIC-GOHLIS, GERMANY.

APPARATUS FOR MAKING NITRIC ACID.

No. 834,257.

Specification of Letters Patent.

Patented Oct. 30, 1906.

Application filed March 13, 1906. Serial No. 305,819.

To all whom it may concern:

Be it known that I, OSCAR HEINRICH ULRICH BRÜNLER, engineer, a subject of the German Emperor, and a resident of 16 Politzstrasse, Leipsic-Gohlis, Saxony, Germany, have invented a new and useful Improved Apparatus for the Oxidation of the Nitrogen of the Air for the Purpose of Obtaining Nitric Acid, of which the following is a specification.

For the purpose of effecting the oxidation of the nitrogen of the atmosphere and the conversion of the oxidation product into nitric acid it is necessary to expose the nitrogen and oxygen which are to be combined to a temperature of 2,500° centigrade. Then the nitric oxid obtained is to be conducted into water in order to convert the same into nitric acid. Since there were no furnaces available by which with a process of combustion such a high temperature could be obtained, expensive electric energy has hitherto been used. By the invention in question this drawback is remedied.

The object of my invention is illustrated in the accompanying drawing, in which the apparatus is shown in sectional elevation.

With reference to the drawing, *a* is a closed pressure-resisting vessel which is partly filled with water.

b is a water-conducting pipe.

d is the furnace with which the pipes *e* connect. Near the inlet of said pipes *e*, which conduct compressed oxygen, pipes *f* are arranged conducting combustibles—oil, gas, coal-dust, or the like.

The furnace *d*, the mouth *h* of which dips into the water, is so constructed that it possesses in proportion to its contents as small a wall as possible. The inlets of the pipes *e* are placed opposite to one another in such a manner that by their opposite radial arrangement the burning gas mixtures blown off with great velocity by them meet together. Thereby strong gyration is produced, which effects a quick and very perfect combustion without the necessity of causing the burning gases to move rapidly to the mouth of the furnace. By this arrangement within the furnace already at a moderate distance from its wall a temperature of nearly 3,000° centigrade is obtained, which increases on approaching the center. Through pipe *g* nitrogen is continually blown in and in such

quantity that the temperature only falls to near the lowest admissible limit at which the oxidation of the nitrogen can proceed.

Instead of separately conducting quantities of nitrogen, as described above, the pipe *g* can be omitted and the nitrogen mixed with the oxygen prior to entering through pipe *e*. By the velocity with which the burning mixture is driven into the furnace the time of combustion can be so accelerated or retarded that the gases leave the mouth of the furnace either with combustion perfectly or partially complete or still fully flaming.

If it is desired to have the flame burning in the water, the narrowed mouth of the furnace effects this very advantageously, because the flame is thereby forced to penetrate deeply into the water in a pointed form. The object of this is to provide that the flame by pushing away the water makes a cavity for itself in which it will have space for development. Further, the flame offers by its shape as small a surface as possible to the cooling effect of the water. The products of combustion and the steam escape through valve *c*. The inside of the furnace cannot be destroyed by the high temperature, since it is cooled on the outside. The portion of the furnace projecting above the water-level is always sufficiently cooled by the water splashing over its surface. The apparatus enables the combustion to be effected under any desired pressure. The valve *i* serves as outlet for the mixture of nitric acid and water.

Having now described my invention, what I claim is—

In an apparatus for the oxidation of the nitrogen of the air for the purpose of obtaining nitric acid, the combination a pressure-resisting vessel, a globular furnace in connection therewith with mouth projecting downward, radially-arranged conducting-pipes opposite each other in the wall of the furnace for leading oxygen, combustibles and nitrogen, and a valve for the escape of gases, and for the purpose specified.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

OSCAR HEINRICH ULRICH BRÜNLER.

Witnesses:

C. DIEDERICH,
FR. HOYERMANN.