B. THOMAS.

FURNACE FOR THE ELECTRICAL OXIDATION OF GASES.

APPLICATION FILED JULY 18, 1917.

1,359,932.

Patented Nov. 23, 1920.

3 SHEETS—SHEET 1.

Fig. 1

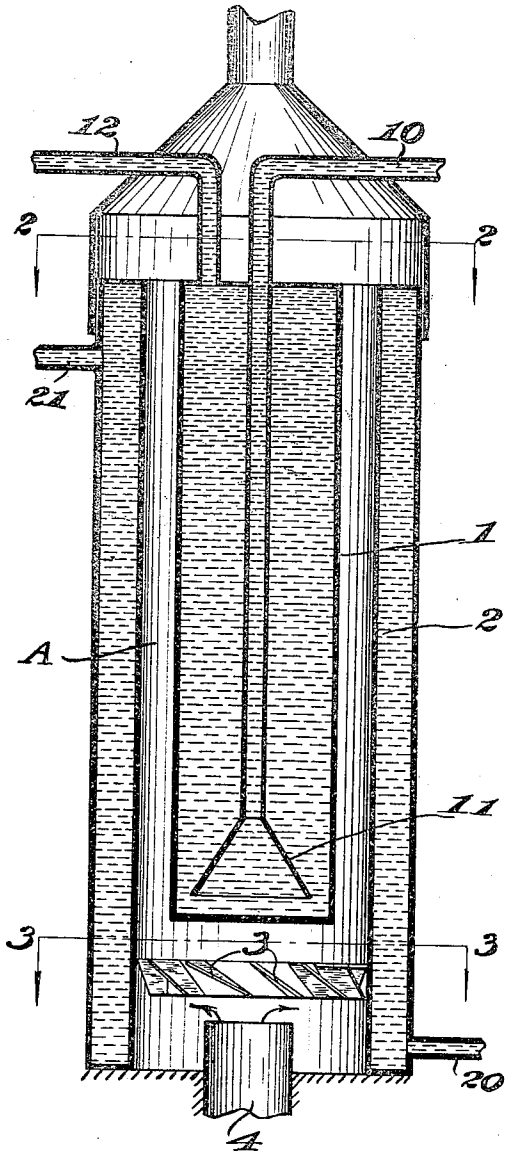


Fig. 2

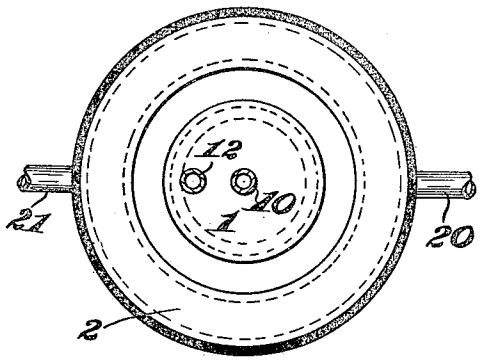
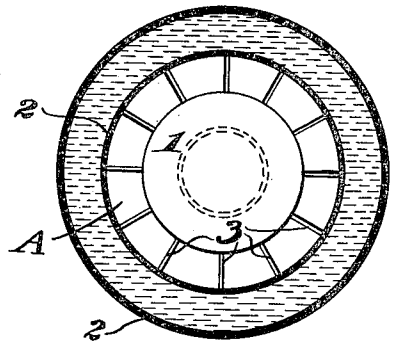


Fig. 3



Inventor

Bruno Thomas

By Henry L. Reynolds.

Attorney

B. THOMAS.

FURNACE FOR THE ELECTRICAL OXIDATION OF GASES.

APPLICATION FILED JULY 18, 1917.

1,359,932.

Patented Nov. 23, 1920.

3 SHEETS—SHEET 2.

Fig. 4.

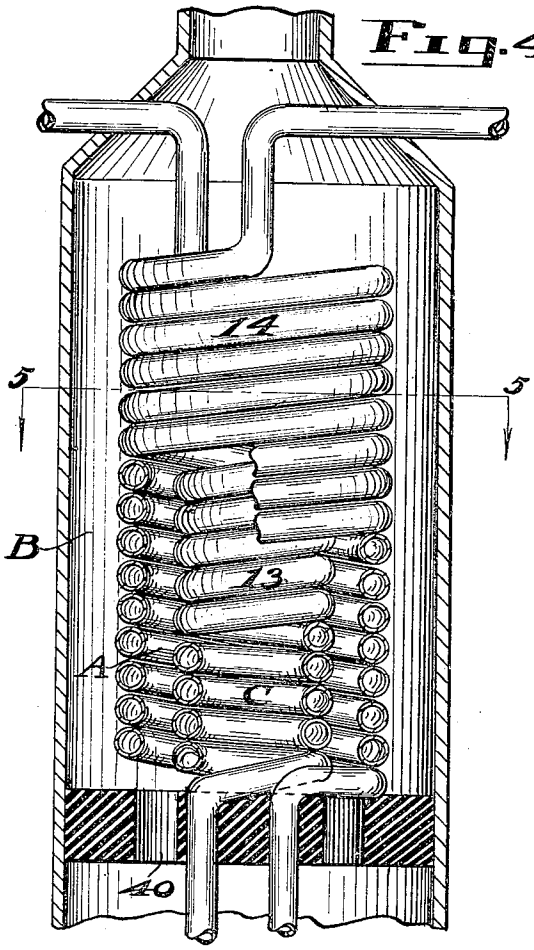
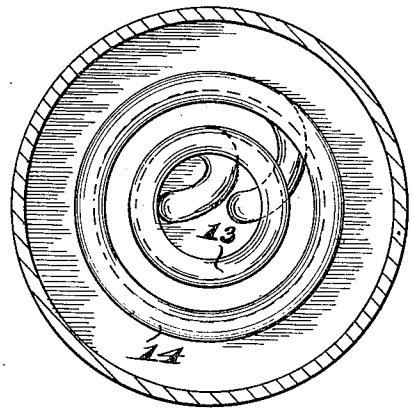


Fig. 5



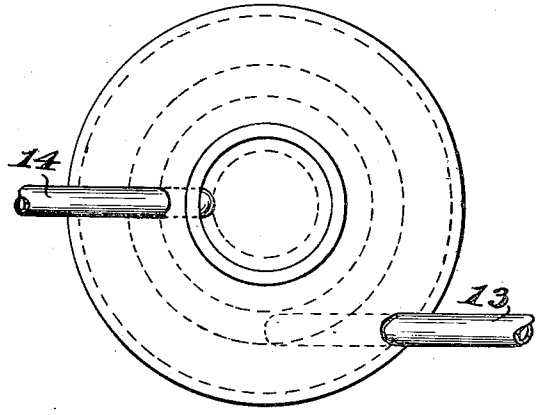


Fig. 6

Inventor

Bruno Thomas

By Henry L. Reynolds.

Attorney

B. THOMAS.

FURNACE FOR THE ELECTRICAL OXIDATION OF GASES.

APPLICATION FILED JULY 18, 1917.

1,359,932. Patented Nov. 23, 1920.

3 SHEETS—SHEET 3.

Fig. 7

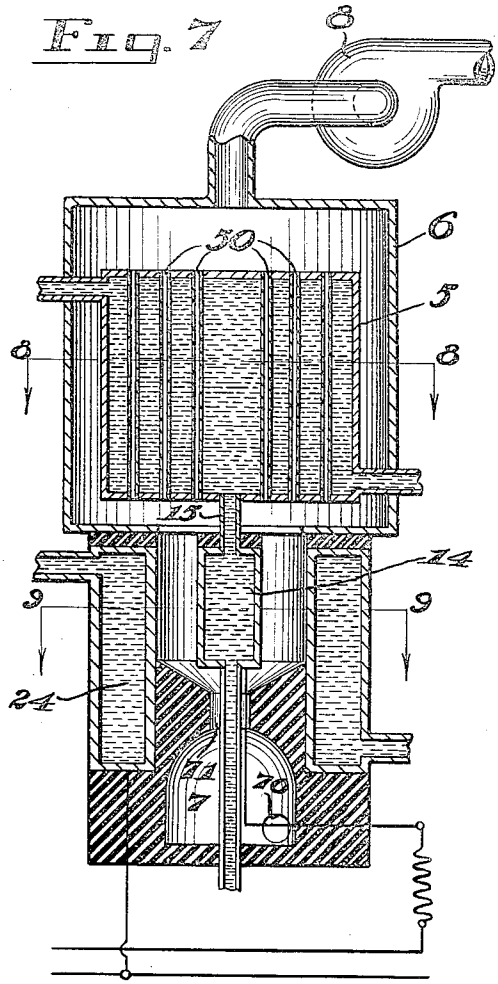


Fig. 8

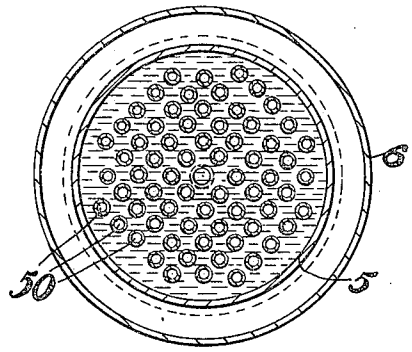
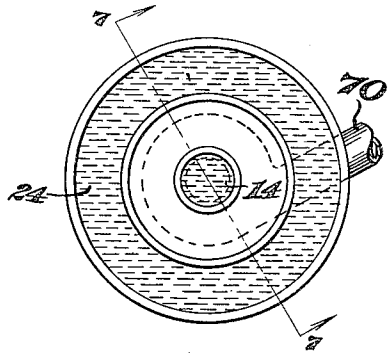


Fig. 9



Inventor

Bruno Thomas

By Henry L. Reynolds

Attorney

UNITED STATES PATENT OFFICE.

BRUNO THOMAS, OF SEATTLE, WASHINGTON.

FURNACE FOR THE ELECTRICAL OXIDIZATION OF GASES.

1,359,932. Specification of Letters Patent. Patented Nov. 23, 1920.

Application filed July 18, 1917. Serial No. 181,196.

To all whom it may concern:

Be it known that I, BRUNO THOMAS, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Furnaces for the Electrical Oxidization of Gases, of which the following is a specification.

My invention relates to furnaces for the electrical oxidation of gases, as for instance, the fixation of atmospheric nitrogen.

The object of my invention is to improve upon the furnaces used for this work and particularly to improve upon their action in the matter of the rapid cooling of the gases after their passage through the oxidizing zone.

The novel features of my invention will be particularly pointed out in the claims.

In the accompanying drawings I have shown preferred forms of carrying out my invention.

Figure 1 is a vertical section and Figs. 2 and 3 are horizontal sections, respectively on the lines 2—2 and 3—3 of Fig. 1, of one form of construction.

Fig. 4 is a vertical section, Fig. 5 a section on the line 5—5 of Fig. 4 and Fig. 6 a top plan view of another form of construction.

Fig. 7 is a vertical section and Figs. 8 and 9 sections respectively on the lines 8—8 and 9—9 of Fig. 8, of a third type of construction.

In this invention I employ concentric electrodes, employing the space between them as the oxidizing or reducing chamber. I also make these electrodes hollow and circulate water therethrough to cool them. I further adopt means which removes the gases promptly from the oxidizing chamber into a cooling zone, thus cooling the gases before dissociation can take place to any material degree.

In the furnace shown in Figs. 1, 2 and 3, the inner electrode 1 is a metal tube or hollow cylinder which is filled with water, the water entering through pipe 10, discharging through cone 11 and out through pipe 12. The other electrode is an annular tube 2, concentric with and surrounding the electrode 1, being spaced therefrom to form a relatively narrow annular oxidizing chamber A. This is also supplied with water through a pipe 20 which water is discharged through pipe 21.

In such a device I prefer to give the air passing through the oxidizing chamber a movement about its axis which will cause it to follow a helical path. In Fig. 1 the means for doing this consists of helically positioned blades 3 placed to act upon the air just before entering the oxidizing chamber A. The air is supplied through pipe 4.

In the form shown in Figs. 4, 5 and 6, the electrodes consist of the helically coiled pipes 13 and 14, placed concentrically in substantially the same relation as the electrodes of Fig. 1. Preferably the coils of these pipes are very slightly separated, so that air introduced within the chamber A between them may pass in thin streams between them into the spaces B and C immediately after it has been oxidized by the action of the arc thereon.

As the water circulation in these tubes keeps them cool they act, not only as electrodes, but also as coolers for the gas. The gas passes between them immediately after having been oxidized and is therefore cooled before dissociation can appreciably act thereon. The air is supplied through openings 40, preferably located to discharge directly into the chamber A.

In the type of construction shown in Figs. 7, 8 and 9, the electrodes themselves resemble those of Fig. 1, except that they are much shorter. The electrode 14 is in the center of the oxidizing chamber A and both 14 and 24 are hollow and have a water circulation through pipes 10 and 11 for the inner electrode and pipes 20 and 21 for the outer electrode.

Above the oxidizing chamber is a cooler, this consisting of a drum 5 having a system of pipes 50 extending through its heads, through which pipes the oxidized gases flow and are cooled. This drum may be directly connected with the inner electrode, as is shown by the pipe 15. The drum 5 is surrounded by a casing 6.

The air for this furnace is given a rotating or whirling movement before entering the furnace chamber. One means for doing this is shown, this consisting of a preliminary chamber 7 which is connected with the furnace chamber by a passage 71 which is central thereof, and to which the air is

supplied through a pipe 70 which is placed tangential to the chamber 7. In consequence, the air is given a strong whirling movement and passes through the oxidizing chamber in helical paths.

The draft through the furnace may be accelerated by the application of suction means to the discharge, as by the fan 8. The air passing through the oxidizing chamber is quickly removed and subjected to cooling action so that dissociation is very much reduced.

What I claim as my invention is:

1. A furnace of the character described comprising two electrodes formed of closely coiled pipe, placed one within the coils of the other and separated from each other to form an annular arcing chamber, and means for circulating a cooling fluid through said pipes.

2. An electrical furnace for oxidizing gases having electrodes composed of helically coiled tubes having successive coils slightly separated to permit passage of gas between said coils being of different diameters and placed one outside the other with a space between which constitutes the arcing chamber, means for introducing the gases to be treated to the chamber between said coils and means for withdrawing the air from the spaces at the opposite sides of said coils.

Signed at Seattle, Washington, this 12th day of July, 1917.

BRUNO THOMAS.