J. S. ISLAND.

DEVICE FOR PRODUCING OXIDS OF NITROGEN.

APPLICATION FILED OCT. 4, 1913. RENEWED AUG. 28, 1915.

1,179,927. Patented Apr. 18, 1916.

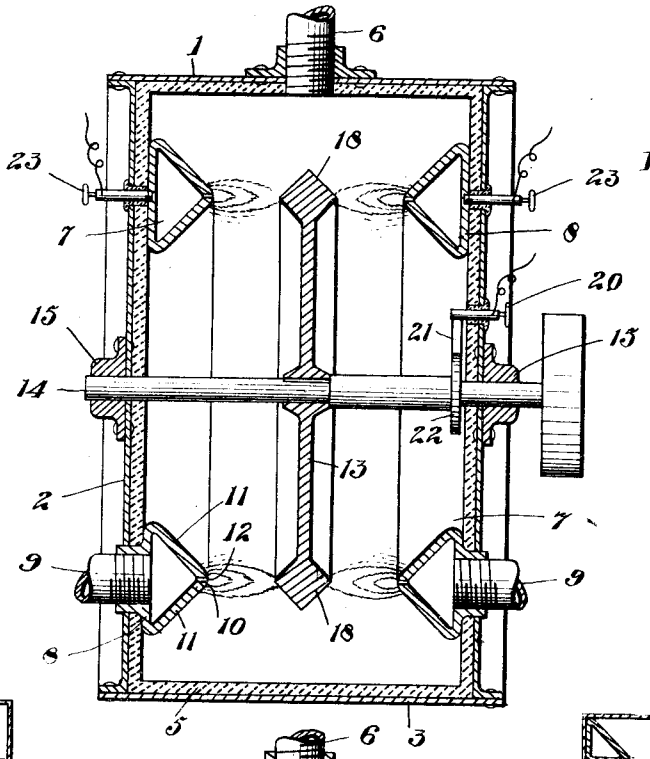


Fig. 1.

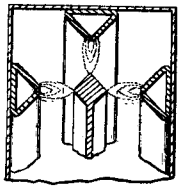


Fig. 3.

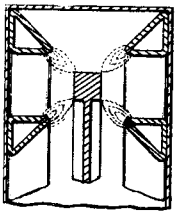


Fig. 4.

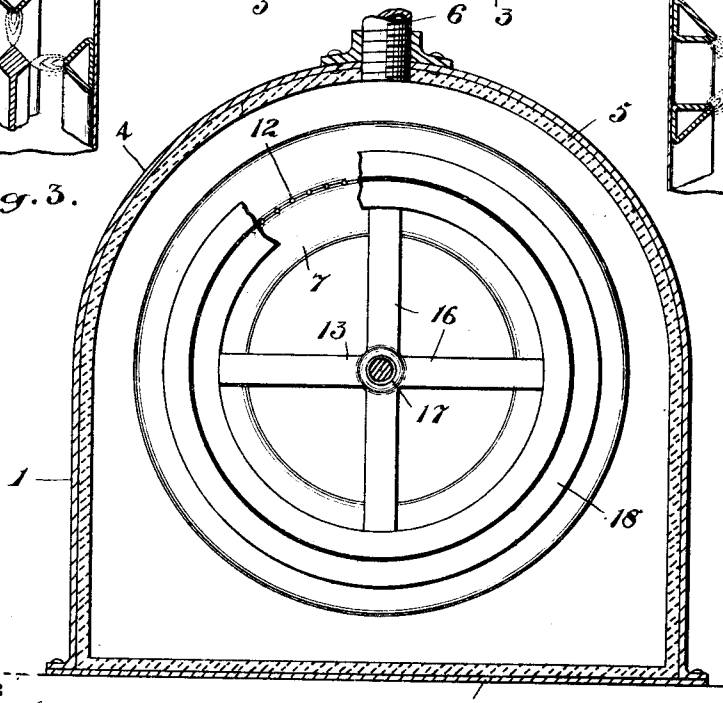


Fig. 2.

WITNESSES:
H. L. Trimble.
E. Heron

INVENTOR:
J. S. Island
by H. J. S. Drimson
atty.

UNITED STATES PATENT OFFICE.

JAMES SIMPSON ISLAND, OF TORONTO, ONTARIO, CANADA.

DEVICE FOR PRODUCING OXIDS OF NITROGEN.

1,179,927. Specification of Letters Patent. Patented Apr. 18, 1916.

Application filed October 4, 1913, Serial No. 793,373. Renewed August 28, 1915. Serial No. 47,894.

To all whom it may concern:

Be it known that I, JAMES SIMPSON ISLAND, a subject of the King of Great Britain, and resident of the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Devices for Producing Oxids of Nitrogen, described in the following specification and illustrated in the accompanying drawings, that form part of the same.

The principal objects of the invention are, to devise an apparatus which will produce oxids of nitrogen in large quantities and at a minimum cost, such apparatus being of a very simple and extremely durable construction which may be operated with a minimum amount of attention.

A further object is to utilize a multi-phase electric current in the production of oxids of nitrogen to the very best advantage obtaining the maximum amount of oxids for the electrical energy used.

The principal feature of the invention consists in the novel construction and arrangement of parts whereby a plurality of annular sheets of electric flame are produced between stationary electrodes and a rotating electrode located therebetween, and a supply of oxy-nitrogen gas is conducted to and passed through such flames to effect the formation and fixation of the maximum quantity of oxids of nitrogen.

In the drawings, Figure 1 is a vertical longitudinal sectional view of a device constructed in accordance with this invention. Fig. 2 is a vertical cross sectional view of the device. Figs. 3 and 4 are detail sectional views showing slight modifications in the arrangement of the electrodes.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 is a closed casing having the parallel sides 2, a base 3, and a semi-circular shaped top 4. The casing 1 is provided with a lining 5 of silica, porcelain or other di-electric material.

6 is the outlet leading from the top of the casing 1.

7 are tubular ring shaped members preferably formed of triangular shape in cross section having the flat outer sides 8 held against the flat sides 2 of the casing.

9 are air inlet pipes leading through the walls of the casing 1 into the said tubular rings and conveying a supply of air thereto from a suitable source. The apexes 10 of the rings 7 formed by the converging inner walls 11 are perforated with a plurality of minute holes 12 arranged close together and extending completely therearound and adapted to project a thin stratum of air inwardly toward the center of the casing.

13 is the rotor electrode secured upon a shaft 14 journaled in the bearings 15 concentrically arranged in the side walls of the casing 1, said rotor having a plurality of radial arms 16 extending from the hub 17 and formed with an annular rim 18. The rim 18 is formed of an angular cross sectional shape preferably substantially of a diamond shape presenting laterally extending sloping sides, the apexes of which are arranged in alinement with the apexes of the tubular rings 7.

20 is a binding post secured in the casing 1 and having a brush 21 at the inner end contacting with the conductor flange 22 electrically connected with the rotor 13.

23 are binding posts supported in the casing 1 and electrically connected with the tubular rings 7. The binding posts 23 are connected to two or more of the terminals of a multi-phase electric generator and the post 20 is electrically connected with another terminal of said generator.

In the use of this device, the electric current flows between the apexes of the rings 7 and the rim 18 of the rotor 13 and an electric flame is formed therebetween. The rotor is rotated in any suitable manner and the result of this rotary movement is that the electric flame which normally will occur in the shortest path is drawn out and is induced to follow around the outer ring thus producing an annulus of electric flame between each of the rings and the central electrode completely filling up the space between the adjacent peripheries of the said electrodes.

A supply of air or other oxy-nitrogen gas is forced into the hollow rings 7 and through the minute holes bored in the apexes thereof. The air is thus introduced into the center of the electrical flame where the zone of highest temperature is located and as it is forced from the orifices by the continued pressure it passes rapidly through the zones of high and lesser temperatures and rapid oxidation of the nitrogen and fixation of the resultant oxids is effected. In introducing the air directly into the highest zone of the

flame the greatest possible volume of oxids of nitrogen is produced as none of the nitrogen can escape contact with the flame. The oxidized air finds egress from the casing through the outlet 6 at the top.

The principle involved in the present application is the same as that involved in my co-pending application No. 668,086 filed in the United States December 27, 1911, in that the air is introduced through perforations in a ring shaped electrode into the highest zone of the electrical flame and the present invention is directed to a further improvement in the construction whereby a much greater volume of air can be effectively passed through a flame in a single machine requiring the minimum amount of power to operate.

What I claim as my invention is:—

1. In a device for producing oxids of nitrogen, a plurality of hollow electrodes each adapted to project an annular sheet of oxy-nitrogen gas, and a rotary electrode arranged adjacent to said hollow electrodes and adapted to form an annulus of electric flame between itself and the said hollow electrodes, said electric flames having their central zones in the plane of the discharge of the oxy-nitrogen gas.

2. In a device for producing oxids of nitrogen, a casing having an outlet therefrom, a pair of hollow ring shaped electrodes of substantially triangular cross section arranged in said casing and connected with a supply of oxy-nitrogen gas and having inwardly directed discharge openings in the apexes thereof, and a rotary electrode arranged adjacent to said rings and having a rim formed with beveled sides presenting apexes arranged in alinement with the apexes of said hollow rings and adapted to create zones of electric flame in the plane of the discharge from said ring electrodes.

3. In a device for producing oxids of nitrogen, a casing having an outlet therefrom, a pair of hollow ring shaped electrodes of substantially triangular cross section arranged in said casing with the flat outer sides abutting the sides of said casing and each having a plurality of minute orifices extending through the apexes thereof adapted to project an annular sheet of oxy-nitrogen gas inwardly toward each other, said ring electrodes having inlets connected with an oxy-nitrogen gas supply, and a rotor electrode rotatably supported equidistant from each of said ring electrodes and having a rim arranged in the plane of the discharge from said ring electrodes and adapted to create an annular sheet of electric flame on each side in the plane of the discharge of the oxy-nitrogen gas.

Signed at the city of Toronto, Ontario, Canada, this 18th day of September, 1913.

JAMES SIMPSON ISLAND.

Witnesses:

E HERON,

A. G. KELLY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."