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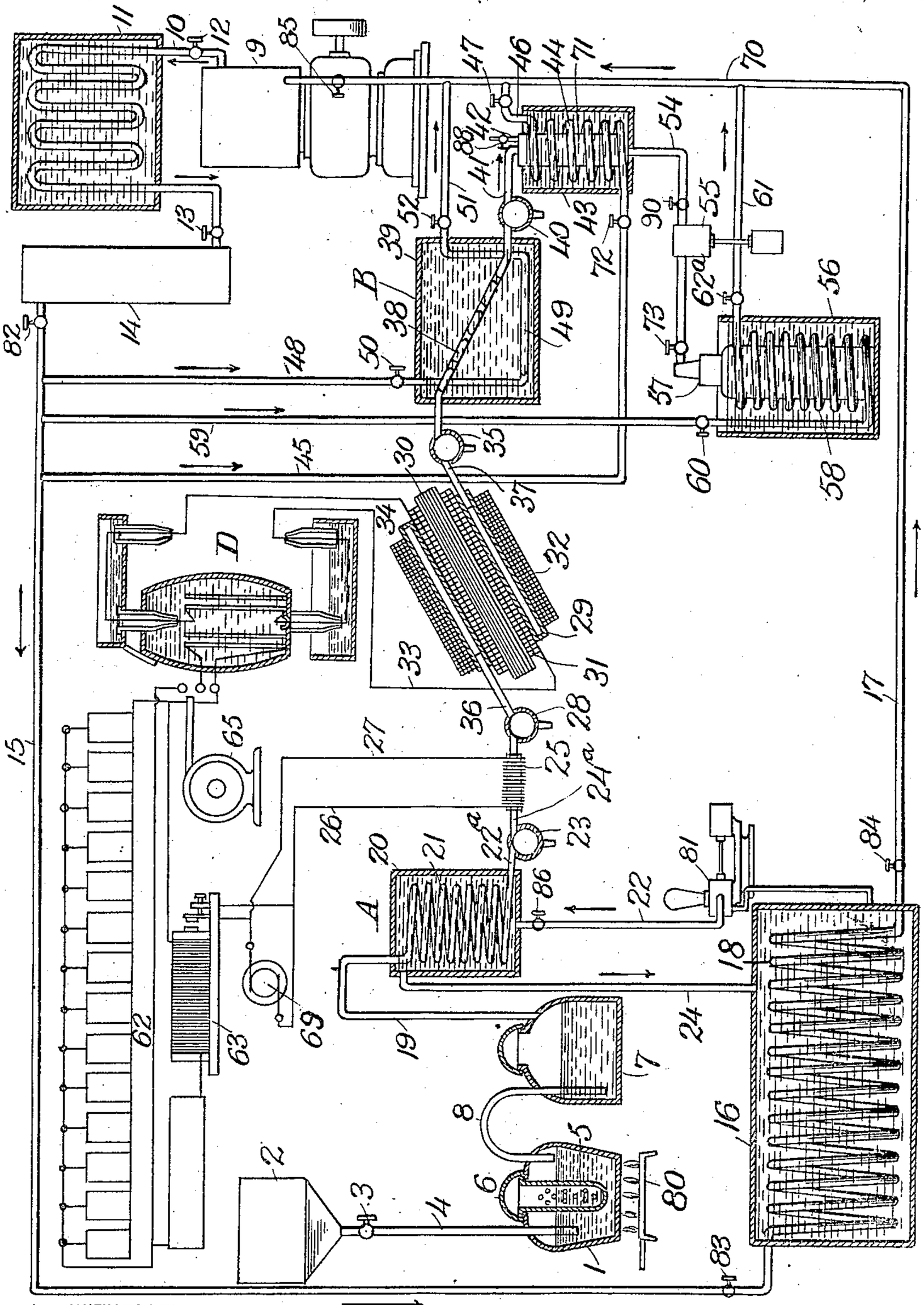
ART OR METHOD OF TREATING AND UTILIZING CHLORIN GAS.

APPLICATION FILED FEB. 5, 1907.

908,126. Patented Dec. 29, 1908.



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ART OR METHOD OF TREATING AND UTILIZING CHLORIN GAS.

No. 908,126. Specification of Letters Patent. Patented Dec. 29, 1908.

Application filed February 5, 1907. Serial No. 355,804.

To all whom it may concern:

Be it known that I, EDWARD C. PARAMORE, a citizen of the United States of America, and a resident of Germantown, city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in the Art or Method of Treating and Utilizing Chlorin Gas, of which the following is a specification.

My invention relates to a process or method of generating, treating and utilizing chlorin gas.

The bleaching properties of chlorin gas are well known, but its useful applicability in the arts has been seriously restricted hitherto by reason of its disagreeable odor and its deleterious effects upon animal life, as well as by the difficulties of divesting articles bleached thereby of the residual odor of the gas.

The object of my present invention is to relieve the chlorin gas of its objectionable odor, and purify it without detracting from its bleaching qualities.

On account of the poisonous and deadly odor of chlorin gas, the use thereof is dangerous in the extreme, although being of such great value as a bleaching agent. Heretofore, various attempts have been made to effectually deodorize the gas without destroying its valuable qualities, and at the same time, so far as possible, enhance its bleaching power, and I have myself likewise made various improvements in this line, as appears from Letters Patent 667,099 and 667,100 dated January 29, 1901 and 786,595 dated April 4, 1905 heretofore granted to me, which inventions and improvements have been productive of the most important results, and which have been practiced by me with remarkable success. The present improvements constitute further developments along the same line, and it is found that the gas treated by my improved process has greater bleaching qualities than before treatment, has little or no odor, bleaches permanently the things which are subjected to its influence, and does not impair the strength of fibrous or other substances with which it is used, but, on the other hand, separates gummy matters from fibers treated and precipitates foreign substances from solutions bleached therewith, thereby enabling most desirable results possible to be attained, and furnishing a bleaching gas originating from a chlorin base and having all the valuable qualities of chlorin in an intensified form without the deleterious qualities.

Referring to the drawing illustrating one form of apparatus for carrying my improved process into practical effect, it is observed that I have delineated in a diagrammatical way the several parts of such apparatus and the various connections so that the steps of the process, the results of each, and the final result, may be clearly described and thoroughly understood.

1 denotes a suitable retort or generator wherein chlorin gas may be generated. At a suitable point above the generator 1 is an acid reservoir 2 connecting with the generator 1 by means of a vertical pipe 4 having a cock 3. The generator 1 is provided with a perforated basket 5 hung centrally therein as indicated. The generator has a suitable cover 6. The basket 5 contains manganese dioxid, or black oxid of manganese, (MnO_2). Such amount of this substance will be placed in the basket 5 as may be proper for the quantity of acid to be used therewith in obtaining the desired result. Reservoir 2 contains hydrochloric acid (HCl), which by coming into contact with the black oxid of manganese will cause the setting free of the chlorin gas. The acid used will ordinarily be an aqueous solution. Obviously the generator 1 may be of any size, shape and material, and if desired a number of them may be used in the same apparatus. With the generator or generators, if preferred, some source of heat or heating device, as for instance the gas jets 80, is employed to accelerate the formation of the chlorin gas, and to obtain the most complete reaction from the chemicals in the generator.

One or more wash-bottles 7 of any suitable form, size, shape and material are employed to receive the generated chlorin gas and take up all the moisture therein, as well as the impurities that were in the manganese. A pipe 8 leads from the upper part of the generator 1 into the wash-bottle 7, discharging near the bottom thereof, and through this pipe the chlorin gas passes into the vessel 7. This vessel 7 contains sulfuric acid (H_2SO_4) in aqueous solution, or some other hygroscopic substance.

In order that a proper cooling effect may be produced in certain portions of the apparatus, in connection with certain steps of the process, which cooling effect I shall fully de-

scribe and which is an important desideratum, I employ a refrigerating mechanism. I will now refer briefly to some of the most important elements thereof.

9 designates a compression pump, serving as an ammonia compressor and intended to operate with anhydrous ammonia. In this compressor the ammonia gas is compressed to a considerable pressure, and from it is discharged through the pipe 10 into the condenser 11. Pipe 10 coils within the condenser 11 and over it flows cooling water, so as to produce a liquefaction of the gas. Of course the form of this condenser element may vary widely. Pipe 10 is provided with a valve 12 to control the passage of the compressed gas to the condenser 11, and also with a valve 13 to control the passage of the liquefied gas away from the condenser 11.

14 denotes an ammonia storage tank. The gas condensed to its liquid state in the condenser 11 passes into the tank 14 which is a vessel of any convenient size and shape adapted to hold a suitable quantity of the ammonia liquid, and from which it may be withdrawn and evaporated in the refrigerating pipes.

15 denotes a pipe leading from the ammonia receiver 14 to a brine tank 16, and 17 indicates a pipe running from the brine tank 16 back to the ammonia compressor 9. Pipe 15 has a valve 82 near the ammonia tank 14, and also a valve 83 near the brine tank 16; and pipe 17 has a valve 84 near the brine tank 16, and also a valve 85 near the compressor 9. Pipes 15 and 17 join within the brine tank to form the coil 18. The tank 16 is filled with brine in any suitable manner. The ammonia coil 18 therein cools this brine to the desired point, so that by means of said tank I provide a body of liquid having the required low temperature. The pipe line 15 may be described as supplying ammonia at condenser pressure, while the return line 17, which passes back to the ammonia compressor, is referred to as having a suction pressure. While these are some of the essential features of the system, others which are tributary or appurtenant to them will be described hereafter.

The chlorin gas after being purified in the wash bottle 7 flows through a pipe 19 to a condensing device A which performs the first cooling operation on the chlorin gas. This device comprises a brine receptacle 20, within which is a gas-carrying coil 21 which forms a part of or is connected with the aforesaid pipe 19. Running from the cold brine tank 16 to the first gas condenser A is a suitable pipe 22 which is a supply or intake pipe for the condenser A, said pipe 22 being arranged in connection with a force-pump 81, and havngi a valve or cock 86. Another pipe 24 leads away from the condenser A near the top thereof back to the cold brine tank 16 and functions as an eduction passage for the overflow of the brine. The pump 81 is constantly operating to carry the cold brine into the chamber 20, from which it circulates back to the cold brine tank 16 through the pipe 24, a continuous circulation being thus kept up. The cold brine in the chamber 20 exercises a refrigerating influence upon the freshly-generated chlorin gas which is coursing through the coil 21, thereby cooling the chlorin gas to the proper point. The temperature of the brine in this condenser A is in practice about zero centigrade, or 32 degrees Fahrenheit, but this can be varied. When the chlorin gas emerges from the first condenser A, it is therefore in a cold state. The coil 21 delivers into the pipe 22^a which may or may not be integral therewith, which pipe 22^a is provided with a small clean-out cup 23 which will receive the condensed impurities and enable them to be removed. In case the process is performed upon tanked chlorin, instead of upon the freshly-generated gas, the gas will be introduced first into the condenser to be properly cooled.

From the first gas-condenser and the pipe 22^a and clean-out cup 23, the cold chlorin gas enters the pipe 24^a, and passes thence into a heater 25, consisting preferably of a tube of porcelain or other vitrified material, surrounded by a coil of electric wire, through which a current is passing by means of conductors 26 and 27, from the alternator 69, whereby the heater 25 is made very hot by the heating of the small coil of resistance wire to a high point by the electric current coming through the conductors 26, 27. The temperature of this heater will be several hundred degrees, say 500 degrees F. The gas when it reaches the heater 25 being very cold is suddenly subjected to the influence of this intense heat which suitably affects the gas and prepares it for the proper action of the electrical current to which it is exposed further on. This heating of the chlorin gas by means of the electric heater 25 is an exceedingly important step in my process, for it is found that the sudden application of the heat accomplishes a transformation or preparation such as fits the gas for electrification in a far more effective way than has heretofore been possible by any other method or apparatus. Thus it is seen that the preparation of the gas for electrification consists in suddenly shocking it with an intense heat application at a time when it is thoroughly cold.

From the heater 25, gas passes into a pipe 36 having a clean-out cup 28, which pipe leads to a compound magnetic dielectric device, as I term it, having a glass chamber 29 through the walls of which both an electrostatic and magnetic inductive influence are caused to pass in such a manner as to effect an increased chemical activity of the gas and

deodorization thereof, presumably by its full or partial ionization. The form of dielectric device, which I have illustrated herein, consists of a cylindrical or tubular glass section 29, the wall of which is hollow to provide an annular closed chamber which is entered at one point by the pipe 36, for the delivery of the gas into the annular chamber; while at another point there emerges the pipe 37 for carrying away the ionized gas.

Centrally within the glass tube is a core of iron 30 around which is wound a primary coil or helix 31, one end of the wire being shown at 33 leading to one pole of the electrical condenser D, while the other end of the wire is shown at 34 leading to the other pole of the electrical condenser D. The outside surface of the annular glass chamber 29 is wound with a secondary helix of fine wire, as indicated at 32. The primary helix is energized by the passage of the electric current therethrough by means of the conducting wires 33 and 34, and as a result of the energizing of the primary helix, the secondary helix 32 is energized by means of magnetic induction, in the well known manner, as typified in transformer construction.

In considering the electrostatic features of this device, it is to be particularly noted that the energizing current supplied to the primary helix is of an extremely high-tensioned oscillatory character, due to the nature of the several parts 62, 63, 64 and D, from which said current is derived. In view of this feature the magnetizing helix 31 is more or less surrounded by an oscillating electrostatic influence radiating therefrom, such as evidences itself in any circuit carrying currents of similar characteristics. The outer helix 32 acting as the step-up coil of a transformer is the seat of even higher potential differences, and is hence similarly surrounded by an oscillating electrostatic influence, any part of which bears a definitely varying relation to the primary helix due to the magnetic inter-linking of the energizing and induced currents in the primary and secondary helices.

From the foregoing it will be apparent that the two helices perform a dual service, being not only magnetically but electrostatically related; acting in the latter capacity somewhat akin to the opposed plates of a condenser or Leyden jar.

As is well known, the two electrostatic fields, being in juxtaposition, powerfully act and react on each other, repelled or attracted as the case may be; in the performance of which feature the intervening gas filled dielectric space formed by the chamber 29 is subjected to powerful electric stresses, serving to produce the chemicalizing and deodorizing effects which are herein set forth.

The dielectric device frees the gas of its impurities and objectionable odor, at the same time increasing its bleaching qualities. When the gas leaves the dielectric device, therefore, its objectionable odor has been removed and the gas is in a purified state. It passes thence through the pipe 37, which has a clean-out cup 35, to the second condenser B, the object of which is to liquefy the gas and prepare it for delivery to a tank or chamber used for the purpose of delivering the liquefied gas to the shipping bottles or packages. This second condenser B consists of a chamber 39 filled with brine, which is cooled by means consisting of an ammonia pipe 48 running from the supply ammonia pipe 15 and entering the chamber 39, so as to properly connect with a coil 49 which is situated in the bottom of the chamber, from which coil a pipe 51, having valve 52, leads away from the chamber 39 to the ammonia suction pipe 70. Pipe 48 is suitably provided with a hand valve 50 to control the passage of the ammonia into the cooling coil 49. The gas-carrying pipe 37 connects with the coil 38 within the brine in chamber 39, said coil being preferably situated in an inclined position as shown in the drawing, and the lower end of the coil 38 connects with a pipe 41, having a clean-out cup 40, said pipe 41 discharging the liquefied gas into a cylindrical receptacle 71 immersed in a brine tank 43 whose brine is cooled by the ammonia coil 44, one end of which connects by pipe 46 with the ammonia suction pipe 70, while the other end connects by pipe 45 with the ammonia pressure pipe 15. The pipe 46 has a hand valve 47, and the pipe 45 a hand valve 72 for controlling the action of the ammonia gas. Receptacle 71 has an air vent 42, which may have a hand valve 88.

The function of the second condenser B, as already intimated, is to liquefy the gas so that it may be shipped in a liquid state, and said condenser, as shown, is similar in many respects, both as to construction and operation, to the first condenser A. The latter, however, is simply for the purpose of cooling the gas, while the second condenser is for liquefying it. Hence, it is desirable and important that the second condenser should have a temperature considerably lower than that of the first condenser, and, for example, it may be said that the temperature of the second condenser B is usually about fifteen degrees below zero, Fahrenheit, or 26 degrees below zero, centigrade.

From the bottom of the collecting chamber 71, runs the delivery pipe 54, provided with a hand valve 73, through which pipe flows the deodorized and perfected liquid chlorin ready for commercial use.

57 indicates a shipping bottle or tank of steel, iron, or other suitable material. In

order that this may receive the liquefied gas and retain it in a liquid state until filled and closed, it is desirable to keep the tank cold, and, consequently, it is immersed in a brine-filled chamber 56, whose brine is cooled by means of the ammonia coil 58, which is supplied with gas through pipe 59 running from pipe 15, said coil having also a connection with the suction part of the system through the pipe 61 which leads to the pipe 70. Pipe 61 has a hand valve 62[a], and pipe 59 a hand valve 60, for controlling the flow of the ammonia gas. Furthermore, it is to be noted that it may be found desirable, in case the flow of the liquefied gas through the pipe 54 to the shipping bottle 57 should not be sufficiently active and continuous, to force the same through the pipe 54; and hence some forcing mechanism, such as a compressor pump, can be utilized for this purpose, the same being indicated in outline at 55, and when this is used, the pipe 54 will have another valve 90. By the adoption of such a compressor pump and its installation in this connection, it will be found that the liquefied gas can be forced into the shipping bottle with perfect ease.

The dielectric device, as already explained, connects with the electrical condenser D by the wires 33 and 34. In explaining the electrical arrangements, reference may be made to a series of Leyden jars 62, of which there may be any number as, for instance, sixteen, a Ruhmkorff induction coil 63, and an alternator 69. The condenser at D is a Thompson or territorial condenser and is filled or partially so with paraffin or other oil.

Many modifications may be made in my improved process and the apparatus by means of which it is carried out without departing from the invention, and I reserve the liberty of making such changes as may be found desirable.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The art of treating chlorin, comprising the following steps, first generating chlorin gas, then washing it with acid to remove moisture and impurities, next cooling it, then heating it to a high degree to prepare it for electrification, then passing it into an electrifying chamber, then electrifying the gas in said chamber by electric influences passing through the dielectric walls of the chamber, and finally liquefying the gas.

2. The art of treating chlorin, comprising first washing chlorin gas with an acid, next cooling the gas, then heating it to a high temperature, and then passing it through a dielectric chamber having dielectric walls and electrifying the gas within said chamber by means of electric influences passing through the dielectric walls.

3. The art of treating chlorin gas, comprising first cooling the gas to the proper degree, then suddenly heating it for the purpose of preparing it for electrification, then passing it through a dielectric chamber having dielectric walls and electrifying the gas in said chamber by means of electric influences passing through the dielectric walls.

4. The art of treating and utilizing chlorin, comprising the following steps, generating chlorin gas, then washing it for the purpose of removing moisture and impurities, then cooling it, then suddenly heating it to a high degree of heat, then passing it into a dielectric chamber having dielectric walls and subjecting it to an electrifying action by means of electric influences passing through the dielectric walls, then refrigerating the purified gas at a lower temperature than its previous cooling for the purpose of liquefying the gas.

5. The art of treating chlorin, comprising the following steps, generating chlorin gas, washing it to eliminate the moisture and impurities, passing it through a refrigerating condenser for the purpose of cooling it, then heating it to a high degree, then passing it through a dielectric chamber having dielectric walls and subjecting it to electrification by means of electric influences passing through the dielectric walls, then again cooling the gas until liquefied.

6. The art of treating chlorin, comprising the following steps, first passing the gas through a refrigerating condenser having a temperature sufficient to properly cool the gas, then suddenly passing the gas through a heater by means of which its temperature will be raised very high for the purpose of preparing it for electrification, then passing the gas into an electrifying chamber having dielectric walls and electrifying the gas in said chamber by means of electric influences passing through the dielectric walls, then passing the purified gas through a second refrigerating condenser having a lower temperature than the first for the purpose of liquefying it, and then forcing the liquefied gas into a suitable receiver.

Signed at New York city, this 1st day of February, 1907.

EDWARD C. PARAMORE.

Witnesses:

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