

1,007,366.

C. W. MARSH.
BLEACH CHAMBER.
APPLICATION FILED JUNE 16, 1909.

Patented Oct. 31, 1911.

4 SHEETS-SHEET 1.

Fig. 1.

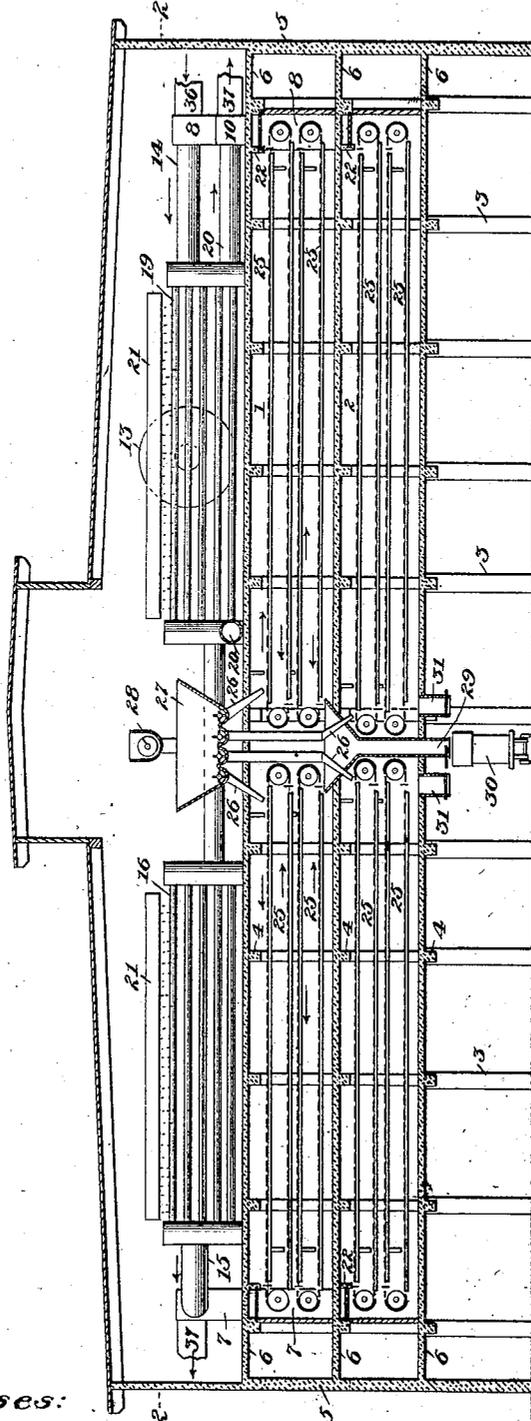
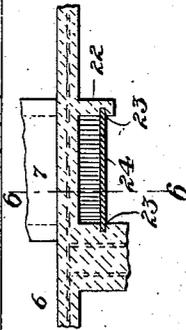


Fig. 3.



Witnesses:
J. E. Chubb
C. H. Potter

Inventor:
Clarence W. Marsh,
By *Byrnes, Downward & Buckenstern*
Att'ys.

C. W. MARSH.
BLEACH CHAMBER.

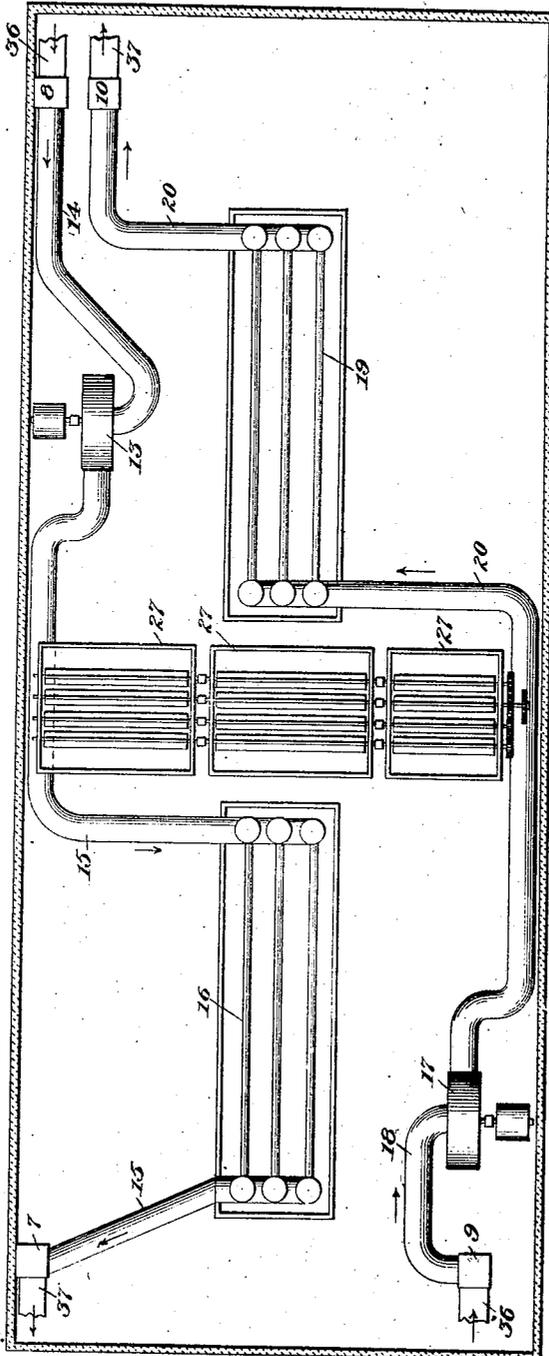
APPLICATION FILED JUNE 16, 1909.

1,007,366.

Patented Oct. 31, 1911.

4 SHEETS—SHEET 2.

Fig. 2.

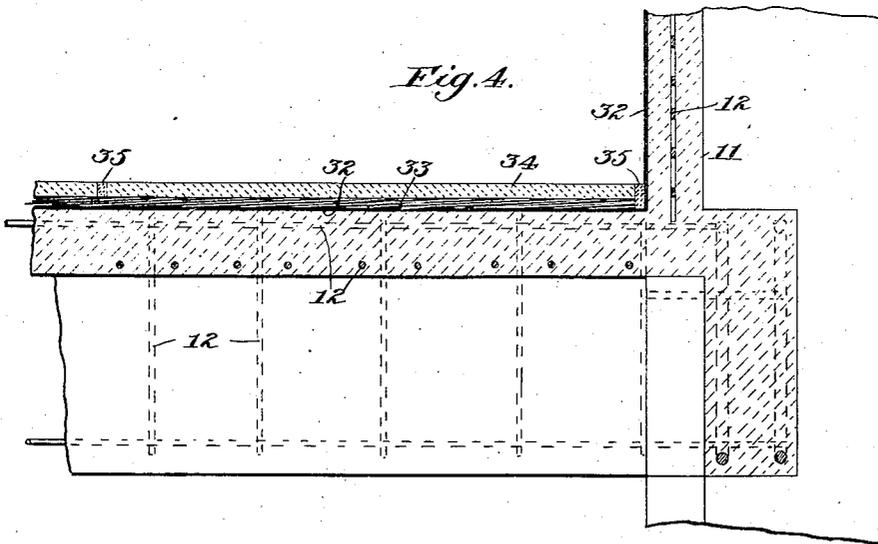
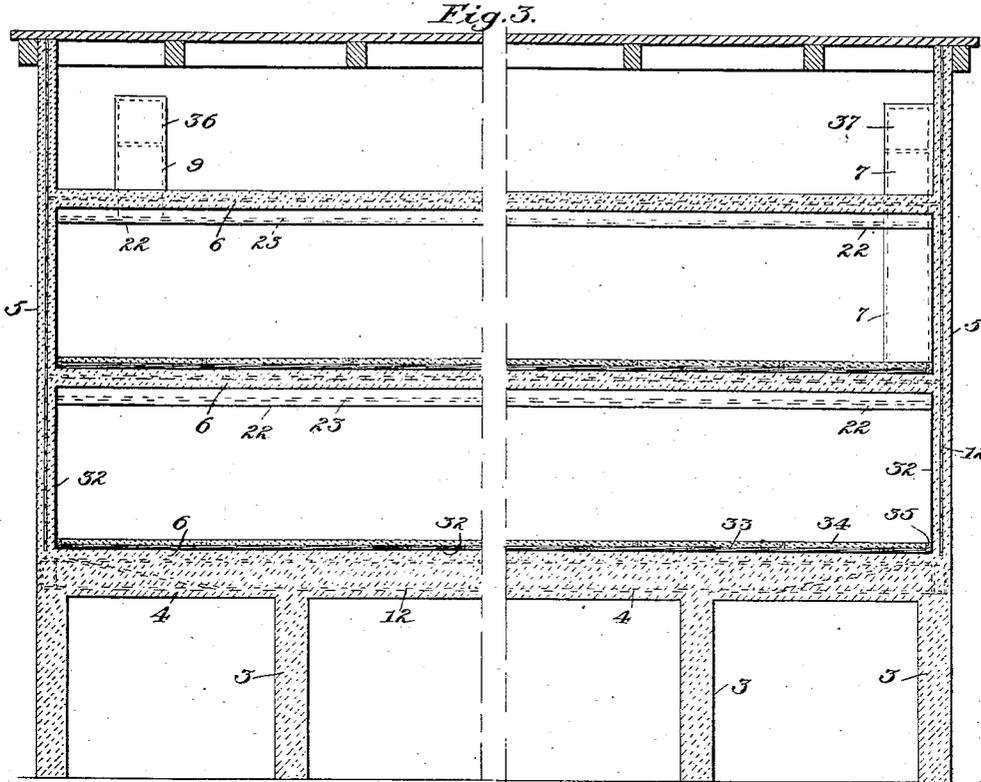


Witnesses:

W. E. Guett
C. H. Oster

Inventor:

Clarence W. Marsh,
By *Bynes, Donald & Buckner*
Attys.



Witnesses:

M. C. Gault
C. H. Pater

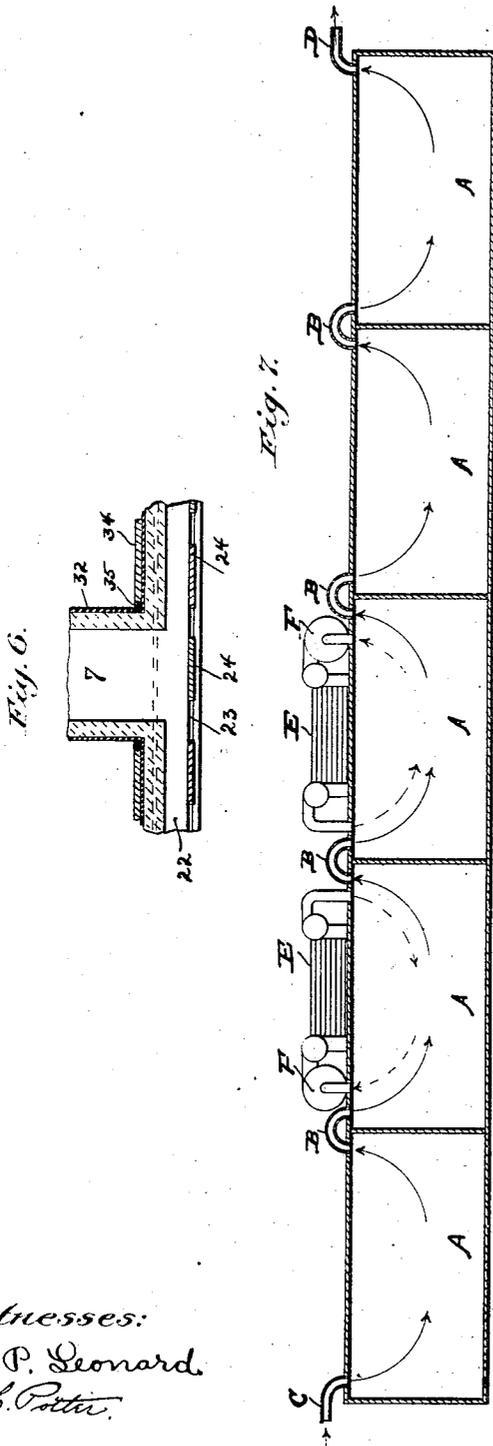
Inventor:

Clarence W. Marsh
by *B. Jones, Edmund R. Beckstein,*
Att'ys.

1,007,366.

C. W. MARSH.
BLEACH CHAMBER.
APPLICATION FILED JUNE 16, 1909.

Patented Oct. 31, 1911.
4 SHEETS—SHEET 4.



Witnesses:
N. P. Leonard.
G. H. Potter.

Inventor:
Clarence W. Marsh,
by Byrnes, Townsend & Bierkenstein,
Att'ys.

UNITED STATES PATENT OFFICE.

CLARENCE W. MARSH, OF NIAGARA FALLS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HOOKER ELECTROCHEMICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BLEACH-CHAMBER.

1,007,366.

Specification of Letters Patent. Patented Oct. 31, 1911.

Application filed June 16, 1909. Serial No. 502,544.

To all whom it may concern:

Be it known that I, CLARENCE W. MARSH, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Bleach-Chambers, of which the following is a specification.

The object of this invention is the provision of an economical and highly efficient means for the manufacture of bleaching powder or chlorid of lime. As is well known, this compound is prepared by subjecting properly slaked lime to the action of chlorin gas, the lime being usually exposed in a bed or layer on the floor of the so-called "bleach chamber," and subjected to the action of chlorin gas at progressively increasing concentration until the desired grade of product is attained. The bleach chambers are commonly constructed of lead, which resists the action of chlorin while freely conducting from the interior of the chamber the heat developed by the reaction. For the production of bleaching powder of satisfactory grade the temperature of the reacting mass must, as is well known be maintained within comparatively narrow limits; and inasmuch as the reaction is strongly exothermic, it is necessary that there should be a flow or transfer of heat from the interior to the exterior of the chamber. Under proper exterior temperature conditions the normal radiation from the metal walls may suffice to maintain proper interior temperatures, and external heating or cooling are resorted to as required. In contradistinction to these metal-walled chambers, the bleach chamber which forms the subject of the present invention is constructed of concrete, cement or equivalent material, suitably reinforced; is provided with an internal gas-tight sheathing, and is adapted by its construction and design to maintain the temperature of the reacting mass within the desired limits under any and all external temperature conditions.

The invention also relates to the provision in bleach chambers of any preferred construction, of means for conveying the lime into and through the chamber and discharging the product therefrom, the lime being preferably exposed in a plurality of

superposed beds to the action of the gas, means being provided for transferring it between these beds.

The invention also comprises means for properly regulating the temperature within the chamber by circulating the gas through the chamber, and through a suitable temperature regulator in which heat may be supplied or abstracted as required.

For a full understanding of the invention reference is made to the accompanying drawings, illustrating apparatus in accordance therewith.

In said drawings:—Figure 1 is a longitudinal sectional view of superposed chambers provided with gas coolers and with superposed supports for the lime, means being provided for conveying the lime continuously or intermittently through the chambers; Fig. 2 is a horizontal section on line 2—2 of Fig. 1; Fig. 3 is a transverse sectional view of superposed chambers, parts being broken away; Fig. 4 is a detail view showing a preferred construction of wall and floor; Fig. 5 is a sectional detail view of construction designed properly to distribute the gas throughout the chambers. Fig. 6 is a sectional view on line 6—6 of Fig. 5; and Fig. 7 is a diagrammatic sectional view of a series of bleach chambers, illustrating the flow of gases therein.

The construction illustrated is essentially monolithic in character, the upper and lower bleach chambers 1, 2, their supporting columns 3, and the transverse beams 4, consisting of a unitary body of reinforced concrete, which may be extended as shown to include the walls 5 of the inclosing building, the working floors 6, and the induction and eduction flues 7, 8, 9, 10, for the gas. The walls 11 of the chambers are as thin as is consistent with structural requirements, and are reinforced by metallic members 12 (Figs. 3, 4,) which may be of any approved type, the floors being similarly reinforced. Such floors and walls are found capable of conducting and radiating heat rapidly: their outer surfaces are highly porous and rough as compared with lead walls, and present therefore a relatively extended radiating surface, which in connection with the high heat-conductivity of the walls themselves and of the metal included therein, is found

to suffice under mean temperature conditions to permit a sufficiently rapid flow of heat to maintain the temperature within the chamber within the necessary limits. In
 5 case of extreme cold provision may be made to check loss of heat, as by warming the inclosing building or by heating the gas as hereinafter described; and when required, heat is abstracted from the circulating body
 10 of gas. The flow of heat through the walls and floors may be accelerated by the provision of cooling flues or pipes therein.

The concrete walls of the chamber, including the floor and roof, are provided with an
 15 internal, continuous, closely-adherent, gas-tight sheathing or membrane indicated at 32 in Figs. 3 and 4, this sheathing covering the entire interior of the chamber, except the usual gas-tight working doors. This sheathing
 20 should be of a material which is impervious to the gas and inert toward it, and which is adapted to close the pores of the cement and to adhere firmly thereto under the conditions of use. Paints or varnishes
 25 containing asphaltum or a suitable hydrocarbon have been found well adapted for the purpose, and possess the advantages that they are very readily and cheaply renewed or repaired, and that by reason of their close
 30 adherence to or interlocking with the cement surface, the effect of any penetration of chlorin into the concrete is strictly localized, and readily detected and repaired. The close adherence of the sheathing is further
 35 advantageous in that it avoids the heat-insulating effect of air or gas spaces between the wall proper and the sheathing.

Above the portion of the gas-tight sheathing covering the bottom of the chamber is
 40 arranged a protective floor, which will receive the lime in case the conveyer system hereinafter described is not used. As shown particularly in Fig. 4, this floor may comprise
 45 lapped strips of tarred or similar impregnated paper 33, preferably laid in asphaltum, and overlaid by concrete slabs 34 having asphalt joints 35.

It is found desirable to provide means, usually exterior to the chambers, for regulat-
 50 ing the temperature therein, and this is most conveniently accomplished by providing for the circulation of the chlorin through the chambers and through a temperature
 55 regulating device preferably arranged outside of the chamber. Means of this character are shown in Figs. 1 and 2, wherein 7 and 8 represent respectively induction and
 60 eduction flues leading to the lower chamber 2, and 9, 10 similar flues communicating with the upper chamber 1. The suction fan 13 receives the gas from the flue 8 through conduit 14 and delivers it through conduit 15
 65 and temperature regulating device 16 to the induction flue 7 leading to the lower chamber. A fan 17 receives the gas from the up-

per chamber through flue 9 and conduit 18 and returns it through the temperature regulator 19, conduit 20 and flue 10 to this chamber. The temperature regulators 16, 19 are usually employed for cooling the gas,
 70 and may comprise as shown a series of parallel pipes mounted in suitable manifolds and cooled by air or by a spray or stream of water or other refrigerant, delivered for example through perforated troughs or
 75 conduits 21. The portion of the circulating system exterior to the chambers may be constructed of earthenware or lead as desired.

It is desirable although not essential to deliver the circulating gas to the chambers
 80 over substantially the entire width of the chamber, and this is most conveniently effected by an arrangement indicated in Fig. 1 and shown in detail in Figs. 5 and 6, where-
 85 in the gas is delivered between the upper portion of the end wall of the chamber and a depending apron 22, the end wall and the apron being recessed as shown at 23 to receive plates 24 of any material inert to the
 90 gas: these plates are spaced apart to permit the gas entering above them to flow downward into the chamber, and are adjustable in the recesses 23 to permit the distribution
 95 of the gas to be varied at will. A precisely similar arrangement may be provided in connection with the eduction flues 8, 10 as indicated in Fig. 1.

It will be understood that a series of chambers is provided, the chlorin passing
 100 through these successively until completely absorbed, and the point of supply of chlorin being shifted as the bleaching powder attains the full strength, as is familiar to those skilled in the art. The means for introducing the gas into the chambers, and for
 105 conveying the partially exhausted gas between the chambers, being well understood, need not be herein described in detail: I have however indicated on Fig. 2, at 36, the gas-inlet to the respective chambers as communicating with the flues 8 and 9, the outlet for the chlorin or residual gases being indicated at 37. By this arrangement there is
 110 a regulated movement of gas into each chamber and through it to the next in series until absorption is complete; and superposed upon such movement is a definite and repeated circulation of the gas through each chamber, whether receiving the strong gas
 115 or the so-called "exit" gas which has been subjected to absorption by lime in a previous chamber. The heat development varies at different stages of the reaction, and with it the degree of temperature change necessary
 120 to secure the best results; but as in practice each chamber in succession receives the strong gas, it is preferred to provide proper circulating means in connection with each chamber, the circulation being used as the
 125 state of the reaction may require. This

mode of circulation is diagrammatically shown in Fig. 7, wherein A, A, etc., indicate a horizontal series of chambers having interconnecting gas passages B. C represents the gas inlet to the series, and D the escape for the final exit gas. In connection with two of the chambers are shown coolers E and fans F, with appropriate flue connection to the chambers, in such manner that the gas may circulate repeatedly through the chamber and cooler. As indicated in this figure the circulation of the gas through the chamber may be either in the same direction as the movement of the gas through the series of chambers, or in the opposite direction to such movement. The circulation of the gas does not interfere with the main flow in any part of the system, provided the valves and pipe lines are tight so that no additional air is introduced. It is customary in extremely hot weather to cool three adjacent chambers independently, the gas from each being circulated through a separate cooler, the chambers to be cooled being usually those receiving the main gas and the first and second exit gases, since in these the reaction is most active. Since the main gas is applied in turn to each chamber, it is preferred to provide cooling connections for each, and by proper pipe and valve connections between the chambers and between the chambers and the coolers, a given number of coolers may suffice for treating the gas from a much larger number of chambers, as will be readily understood by those familiar with the art.

The chambers may be used in the manner commonly practiced in the art, the lime being distributed over the floors, the gas absorbed therein, and the product removed. A considerable increase in the capacity of the chambers, together with a decided economy of operation, is effected however by the provision of means for conveying the lime into and through the chambers and discharging it therefrom when the absorption is complete. Such means may operate continuously or intermittently, and are illustrated in one form in Fig. 1, wherein 25, 25 represent a series of flight conveyers of any suitable construction, arranged to receive lime through delivery tubes 26 from a hopper 27, into which it may be delivered by a screw conveyer 28. As shown, the upper chamber 1 contains superposed flight conveyers 25 on each side of the central hopper 27, these conveyers being capable of movement as indicated by the arrows and conveying the lime through the gas at successively lower levels, and finally delivering the bleaching powder through chute 29 to the drums 30. The arrangement shown in the lower chamber 2 is of like character, the lime being received at or near the center of the chamber, and the bleach being delivered

through chutes 31. Obviously the mechanical means for conveying the lime through the chamber may be varied at will.

While the passage of the lime may under proper conditions be made continuous, it is usually preferable to operate the flights only until the lime is distributed over their surfaces: they are then permitted to remain at rest until absorption of chlorine is complete, when they are again operated for the discharge of bleaching powder. By operating in this manner the chambers may receive gas of progressively increasing concentration as in the usual practice, there being no necessity of adjustment of the rate of movement of the flights to the concentration of the gas. The arrangement whereby the lime is exposed in several superposed planes and transferred from higher to lower planes, while advantageously applied to any bleaching chamber, is particularly advantageous in connection with the gas-circulating and cooling system as above described; for in such system the distribution of the gas in each chamber is comparatively uniform, and the product is therefore regular in composition and character. Further, the cooling of the gas permits the temperature control of the reaction in beds of lime arranged out of contact with the walls or floor of the chamber.

I claim:

1. A bleach-chamber having inclosing walls of reinforced concrete, and an internal, closely-adherent, gas-tight sheathing therefor composed of a material resistant to chlorine.

2. A bleach-chamber having inclosing walls of reinforced concrete, an internal, closely-adherent, gas-tight sheathing therefor composed of a material resistant to chlorine, and a protective floor in said chamber overlying said gas-tight sheathing.

3. A bleach-chamber construction comprising superposed chambers having inclosing walls and a dividing floor of reinforced concrete, and an internal gas-tight sheathing for each of said chambers.

4. A bleach-chamber construction comprising superposed chambers having inclosing walls and a dividing floor of reinforced concrete, an internal gas-tight sheathing for each of said chambers, and means for withdrawing from each of said chambers the excess of heat developed by the reaction therein.

5. A bleach-chamber construction comprising superposed chambers having inclosing walls and a dividing floor of reinforced concrete, an internal gas-tight sheathing for each of said chambers, and a protective floor in each chamber overlying said gas-tight sheathing.

6. A bleach-chamber construction comprising superposed chambers having inclos-

ing walls and a dividing floor of reinforced concrete, an internal gas-tight sheathing for each of said chambers, and means for circulating the gas through each of said chambers and through a temperature-regulating device.

7. A bleach-chamber having inclosing walls of reinforced concrete, a temperature-regulating device, and means for establishing a circulation of the gas through said chamber and temperature-regulating device.

8. A bleach-chamber having inclosing walls of reinforced concrete, superposed, spaced supports for lime within said chamber, a temperature-regulating device, and means for establishing a circulation of the gas through said chamber and temperature-regulating device.

9. A bleach-chamber having inclosing walls of reinforced concrete, an internal gas-tight sheathing therefor, a plurality of superposed, spaced supports for lime within said chamber, means for transferring the lime between said supports, a temperature-regulating device for the gas, and means for circulating the gas through said chamber and temperature-regulating device.

10. A bleach-chamber construction comprising a series of chambers, gas passages connecting said chambers, means for sup-

plying chlorin to said series, and means connected with individual chambers of the series for establishing a circulation of gas in said individual chambers.

11. A bleach-chamber construction comprising a series of chambers, gas passages connecting said chambers, means for supplying chlorin to said series, and means connected with individual chambers of the series for establishing a circulation of gas through said individual chambers and through a temperature-regulating device.

12. A bleach-chamber having inclosing walls of reinforced concrete, an internal gas-tight sheathing therefor, and means for controlling the temperature within said chamber.

13. A bleach-chamber having inclosing walls of reinforced concrete, an internal gas-tight sheathing therefor, a protective floor in said chamber overlying said gas-tight sheathing, and means for controlling the temperature within said chamber.

In testimony whereof, I affix my signature in presence of two witnesses.

CLARENCE W. MARSH.

Witnesses:

ISABEL HELEN SIMONS,
NETTIE M. BOYLE.