

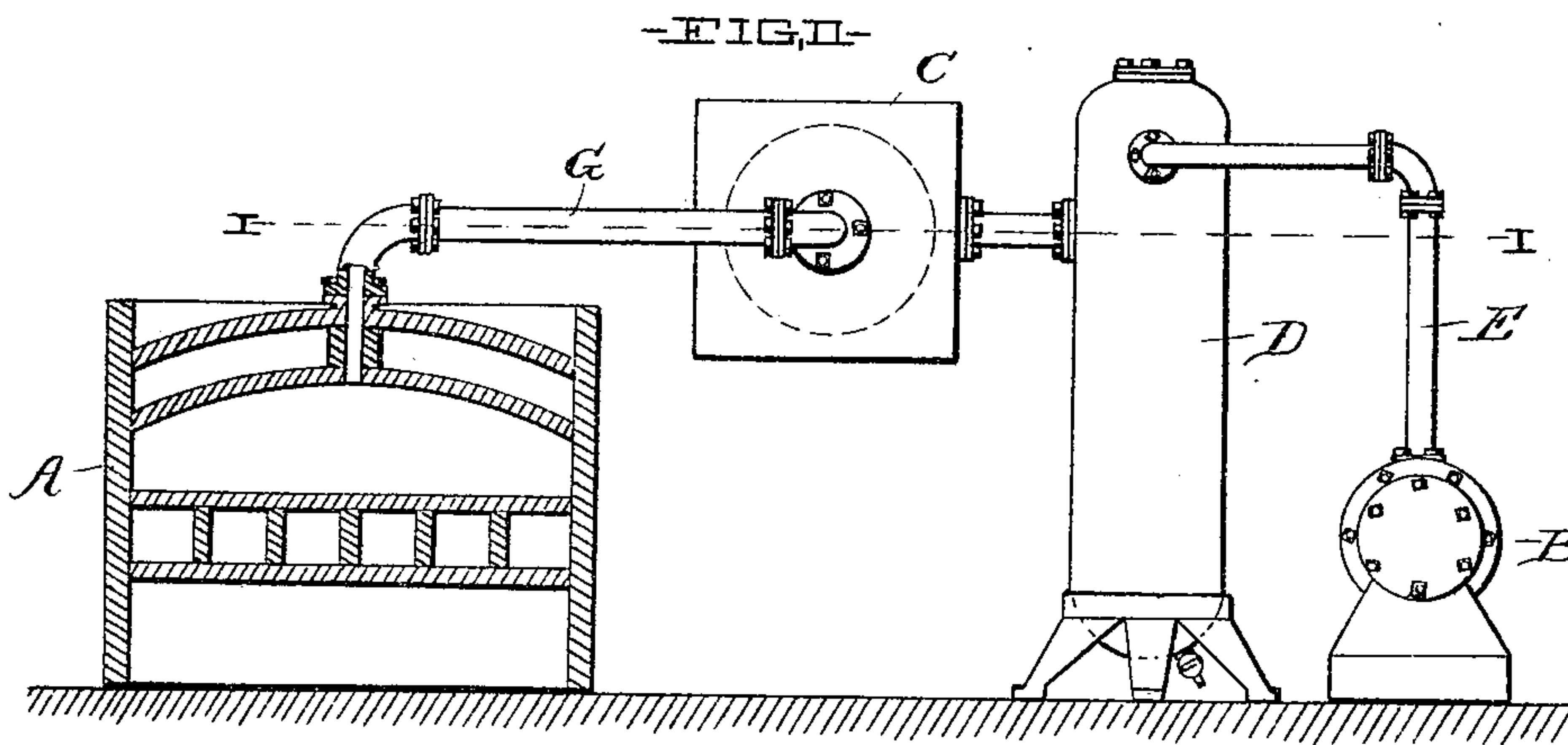
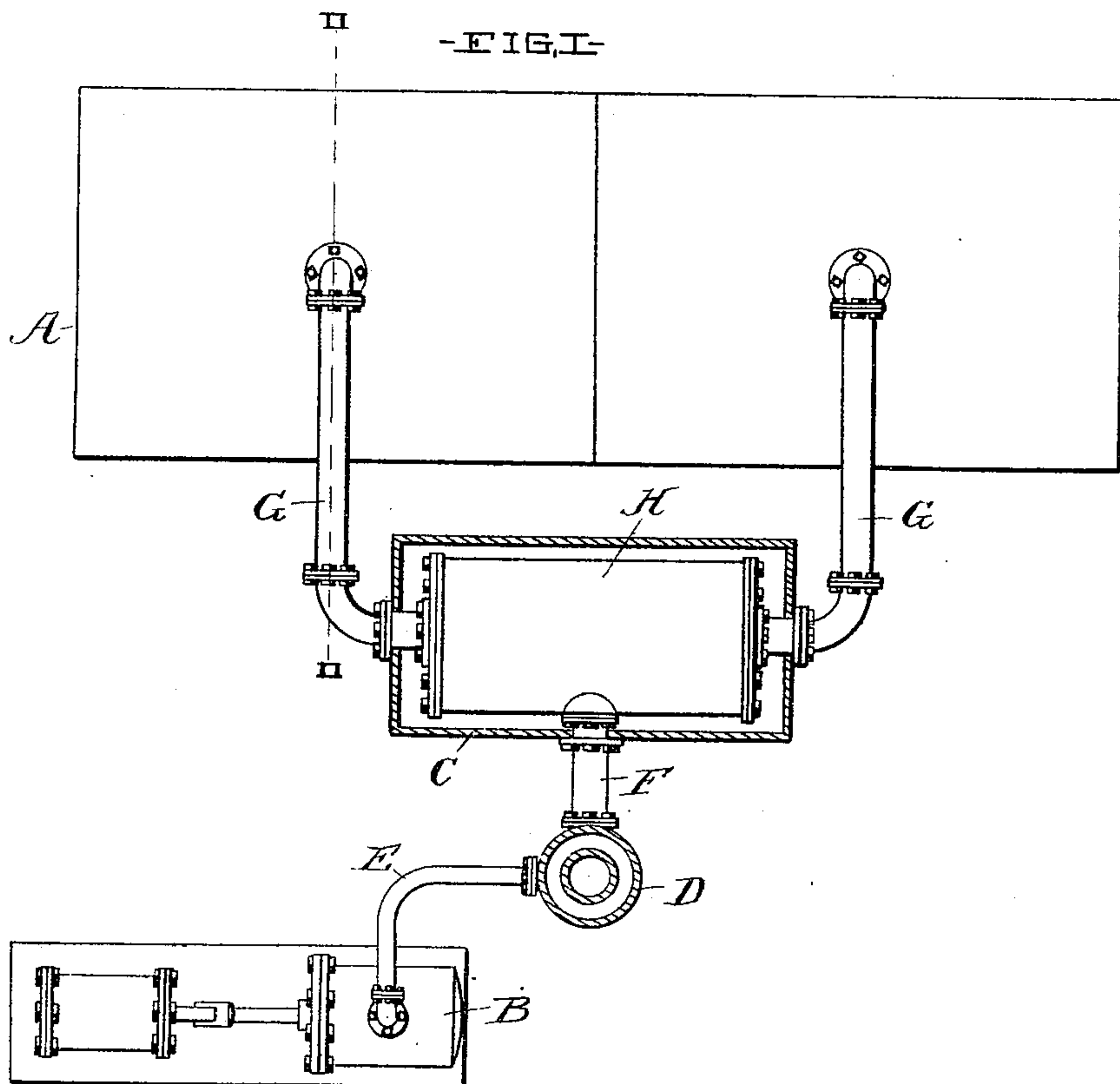
No. 635,389

Patented Oct. 24, 1899.

A. S. RAMAGE.
PROCESS OF OBTAINING IRON OXIDS.

(Application filed Apr. 29, 1897.)

(No Model.)



WITNESSES:
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UNITED STATES PATENT OFFICE.

ALEXANDER S. RAMAGE, OF CLEVELAND, OHIO, ASSIGNOR TO THE
CONTINENTAL CHEMICAL COMPANY, OF SAME PLACE.

PROCESS OF OBTAINING IRON OXIDS.

SPECIFICATION forming part of Letters Patent No. 635,389, dated October 24, 1899.

Application filed April 29, 1897. Serial No. 634,439. (No specimens.)

To all whom it may concern:

Be it known that I, ALEXANDER S. RAMAGE, of Cleveland, Cuyahoga county, Ohio, have invented certain new and useful Improvements in Processes of Obtaining Iron Oxids; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to a new and improved process of obtaining ferric oxid from sulfate of iron; and it relates more particularly to an improved process of obtaining ferric oxid of various shades and colors, and sulfate or chlorid of magnesia as a by-product, from a mixture of sulfate or chlorid of iron and magnesite, dolomite, calcined magnesia, or other carbonates of magnesia.

My invention consists in placing a mixture composed of sulfate or chlorid of iron and magnesite, dolomite, calcined magnesia, or carbonate of magnesia, or a mixture of the said salts of iron with magnesia or a suitable carbonate of any alkaline earth, (which will give a soluble sulfate or chlorid when heated with a sulfate or chlorid of iron,) with or without a small quantity of sodium chlorid being added thereto, in a suitably-closed furnace, preferably so constructed that a partial vacuum can be formed therein, and heating the said mixture under suitable conditions of pressure and temperature until new substances are formed by chemical action and certain desired results are obtained.

The object of my invention is to secure a suitable quality of ferric oxid of any particular shade or color desired and in the same operation to obtain sulfate of magnesia as a by-product, whereby I obtain iron oxid possessing finer and more brilliant shades of color at a greatly-reduced cost. I secure results in a few hours which otherwise, by the methods heretofore used, would require several days, and I also accomplish other objects, as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a plan view, partly in section, of an apparatus capable of carrying out my process; and Fig. 2 is a vertical section on the line II of Fig. 1.

The manner in which I prefer to carry out

my process is as follows: The sulfate of iron is first dried by gentle heat until all the water of crystallization is as far as possible dispelled. It is then mixed with a suitable quantity, preferably about twenty per cent., of magnesia or calcined magnesia and placed in a furnace A, preferably a plus-pressure muffle-furnace, such as the type employed in the well-known Leblanc soda process, having its fire-box located about twelve feet below the bed of the furnace, so constructed as to permit a partial vacuum being formed therein. The furnace is heated to a dull-red heat or to approximately that temperature, and a partial vacuum is produced within the same by means of exhaust mechanism provided for this purpose, comprising a vacuum-pump B, a lead-lined box C, and an asbestos-filled cylinder D, interposed between the furnace and pump B, these parts of the apparatus being connected together and to the furnace and pump by suitable pipes E, F, and G. A pipe or cylinder H is arranged within the box C, communicating with the pipes F and G. The box C is supplied with water, which surrounds the cylinder H to cool the gases, and the asbestos-filled cylinder D serves to further cool them. Double decomposition of the substances composing the said mixture takes place, and the chemical elements recombine to form ferrous oxid and sulfate of magnesia. The ferrous oxid is oxidized to ferric oxid by the oxygen contained in the air which remains in the furnace.

The length of time the mixture remains in the furnace varies from two to twelve hours, according to the shade or color required.

In order to produce the deeper shades of red—such as the Indian, Tuscan, and purple reds—a small quantity of sodium chlorid, preferably from two to ten per cent., according to the shade required, is added to the above mixture of iron sulfate and magnesite or calcined magnesia before it is placed in the furnace. The sodium chlorid is decomposed by the heat of the furnace and the chlorin which is evolved forms ferric chlorid, which is instantly converted to ferric oxid of a deep shade.

Instead of magnesite or calcined magnesia ground or calcined dolomite can be used,

which gives less sulfate of magnesia and an impure oxid of lime. This impure oxid, technically known as "Venetian red," can be utilized in the art and is valuable for various commercial purposes.

It will be observed that chlorid of iron can be treated in a similar manner according to the above-described process, the resulting products being ferric oxid and chlorid of magnesia instead of sulfate of magnesia.

After the mixture has remained in the furnace a sufficient length of time to develop the particular shade or color of ferric oxid desired it is withdrawn from the furnace and thoroughly ground with water and is then run into a tank and allowed to settle. The ferric oxid settles to the bottom, and the water containing the sulfate or chlorid of magnesia in solution can be run off and the sulfate or chlorid of magnesia crystallized out and used for commercial purposes. The iron oxid which remains in the bottom of the tank is filtered, washed, dried, and ground and is then ready for the market.

It will be understood that I lay great stress in the use of a partial vacuum in practicing my process, as by the use of said partial vacuum the chemical reactions take place in the furnace at a much lower temperature than would be possible if said changes occurred under ordinary atmospheric pressure. It will be understood, however, that by using a partial vacuum, and owing to the porosity of the brick walls of the furnace, there is always sufficient oxygen present to change any ferrous salts to the ferric state.

What I claim is—

1. The herein-described process of obtaining ferric oxid and sulfate of magnesia, which consists in heating a mixture of sulfate of iron and calcined magnesia in a partial vacuum until the desired shade is obtained, substantially as and for the purpose set forth.

2. The herein-described process of obtaining ferric oxid, which consists in heating a mixture of sulfate or chlorid of iron, magnesite or calcined magnesia and sodium chlorid in a partial vacuum, substantially as and for the purpose set forth.

3. The herein-described process of obtaining certain shades of ferric oxid and sulfate of magnesia from a mixture of sulfate of iron, magnesia and sodium chlorid, which consists in heating said mixture to approximately a dull-red heat in a partial vacuum until the desired shade is obtained, substantially as described.

4. The herein-described process of obtaining ferric oxid, which consists in forming a mixture composed of sulfate or chlorid of iron and approximately twenty per cent. of magnesia, heating said mixture in a suitable furnace to approximately a dull-red heat in a partial vacuum produced in said furnace by suitable means provided for this purpose until the desired color is obtained, substantially as and for the purpose set forth.

5. The herein-described process of obtaining certain shades of ferric oxid and sulfate of magnesia as a by-product, which consists in forming a mixture composed of sulfate of iron and approximately twenty per cent. of magnesia, adding thereto from two to ten per cent. of sodium chlorid; and heating said mixture in a suitable furnace under reduced atmospheric pressure to approximately a dull-red heat, substantially as and for the purpose set forth.

6. The herein-described process of obtaining ferric oxid and sulfate of magnesia as a by-product, which consists in providing a mixture composed of sulfate of iron with magnesia or any suitable alkaline earth (which on being heated with sulfate of iron would be changed to a soluble sulfate), then adding thereto approximately two to ten per cent. of sodium chlorid, and heating said mixture in a suitable furnace under a partial vacuum to a dull-red heat, substantially as and for the purpose set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 11th day of February, 1897.

ALEXANDER S. RAMAGE.

Witnesses:

ALBERT M. AUSTIN,
W. E. DONNELLY.