No. 806,048. PATENTED NOV. 28, 1905.

R. BAGGALEY.

HEAT TRAVEL CONTROLLER FOR FURNACE WALLS.

APPLICATION FILED JAN. 26, 1905.

2 SHEETS—SHEET 1.

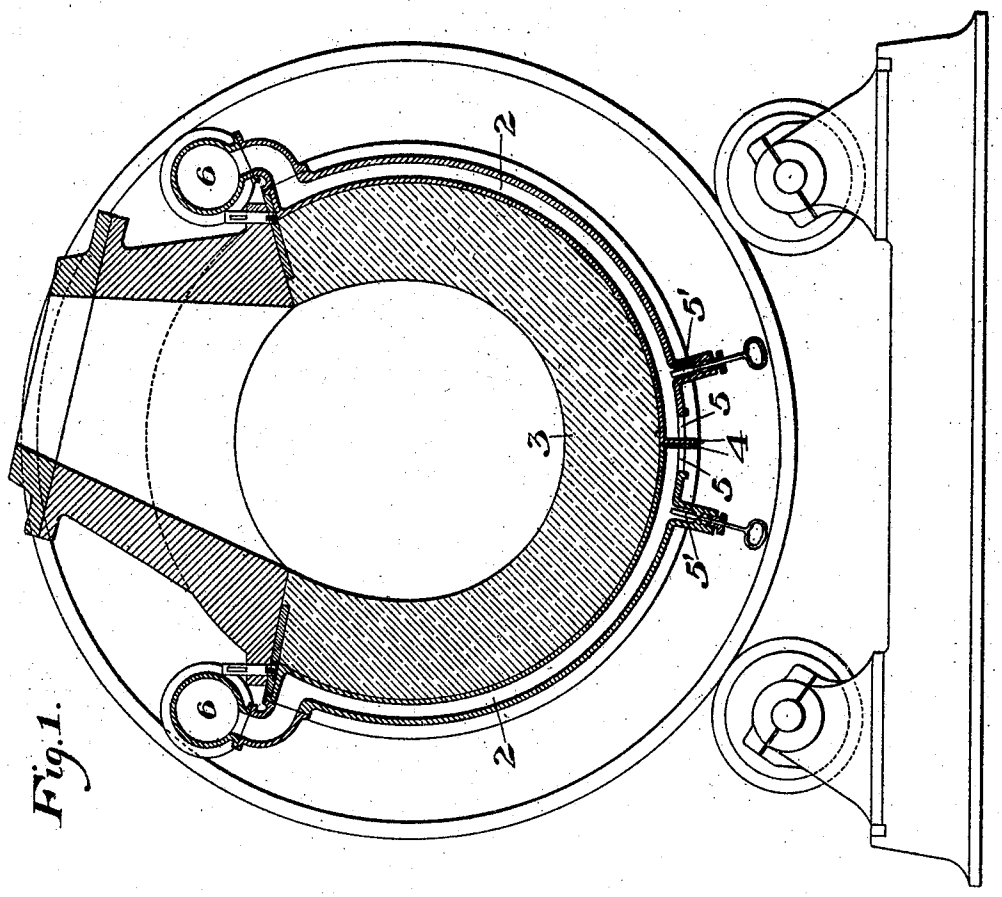


Fig. 1.

WITNESSES

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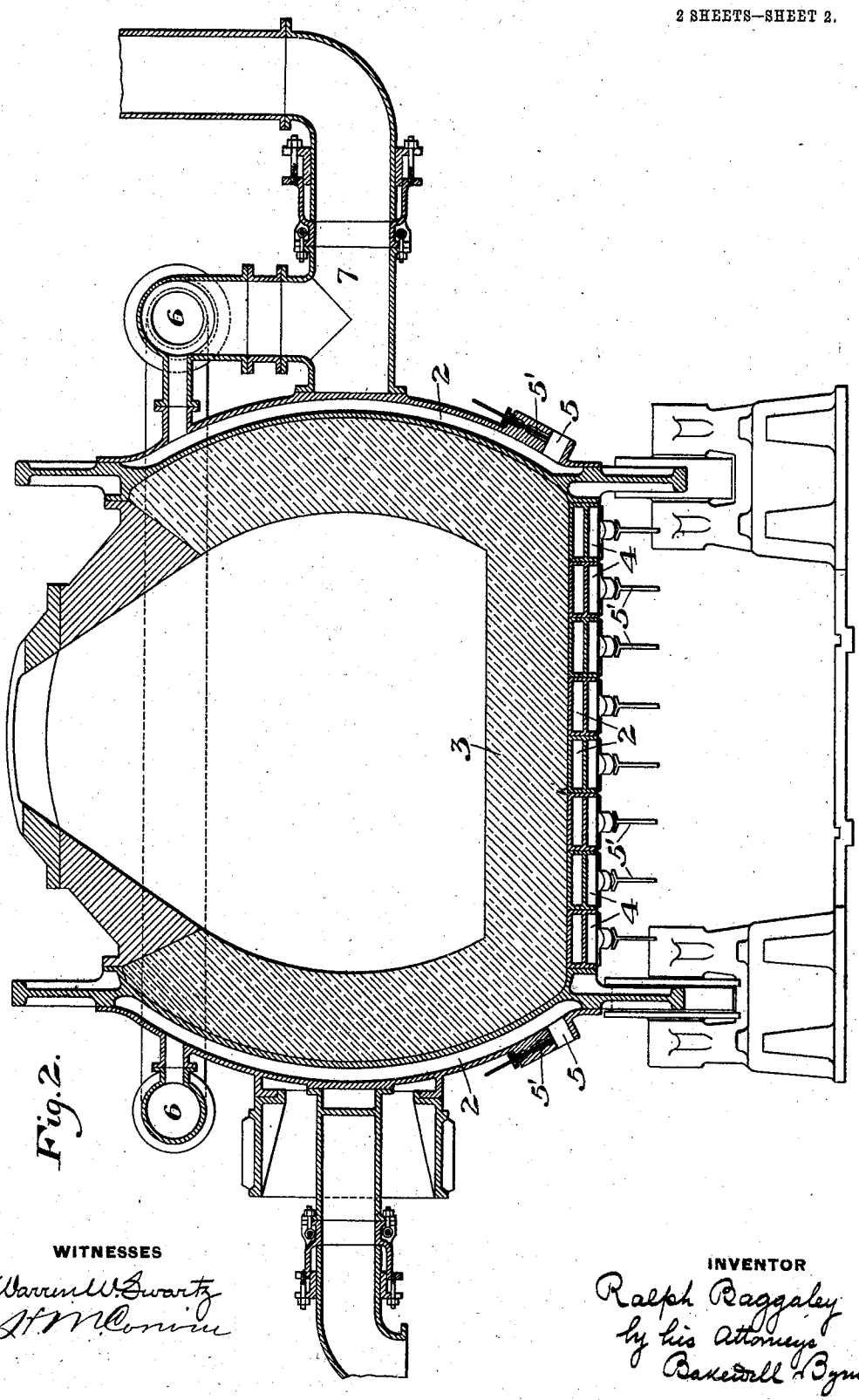


Fig. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

HEAT-TRAVEL CONTROLLER FOR FURNACE-WALLS.

No. 806,048. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed January 26, 1905. Serial No. 242,759.

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Heat-Travel Controller for Furnace-Walls, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a cross-section of a converter embodying my invention, and Fig. 2 represents a longitudinal cross-section of Fig. 1.

The object of my invention is to place a limit on the indefinite travel of heats through the refractory walls of furnaces or converters, and more especially the latter, for use in connection with new method of recovering values from ores by dissolving in a molten bath, for which United States Patent No. 766,654 was issued on August 2, 1904, to Ralph Baggaley and Charles M. Allen.

My present invention is an improvement on the converter described in United States Patent No. 764,332, issued on July 5, 1904, to Ralph Baggaley.

It has been found that after the internal heat produced by the various metallurgical processes—such as smelting, converting, &c.—has been permitted to travel through a refractory wall of either basic or acid material of moderate thickness—say twelve, eighteen, or twenty-four inches—the heat-absorptive powers of such refractory material are so great that the subsequent heat travel may be controlled by comparatively mild means. For instance, if provision be made for carrying away with sufficient rapidity the radiated heat from the outer surface of such refractory wall a limit may thus be placed with comparatively mild means on such heat travel, and in this way a furnace-wall of moderate thickness may be used successfully without injuriously abstracting the internal heat of the metallurgical processes. If such provision be not made, it has been found by test that such heat travel becomes almost indefinite. Thus, for instance, heat has traveled by test through five feet of silica brick. It has also been found by test that where a thick silica-brick wall was used in a steel furnace the absorptive power of the wall and the rapid radiation that continuously occurred from its outside surface were sufficient to keep it cool enough to admit of holding one's hand upon it without discomfort. A load of sharp sand was piled against the wall and in a short time thereafter it became heated almost to a white heat.

In practicing the art disclosed in United States Patent No. 766,654, dated August 2, 1904, it has been found that the service on the vessel is very severe, and that for this reason converters of ordinary construction will not successfully withstand the great heat produced for any great length of time without injury and undue expense for repairs.

The thick walls that at present withstand the great heat of the Siemens-Martin process and other metallurgical processes and are sometimes fifty-two inches in thickness, cannot be used to advantage in the treatment of copper ores and are particularly objectionable in all kinds of converter work.

My present invention makes it possible to handle great heats produced by the converting process successfully and continuously with vessels whose walls are of moderate thickness.

My preferred construction consists in building up a converter or a metallurgical furnace of any kind of a number of narrow metal air-jackets, preferably made of cast metal for convenience and economy, which are placed side by side like the staves of a barrel. Such air-jackets are provided with suitable inlets with dampers or valves to admit the air of the atmosphere, preferably at the lowest point in each jacket. The upper portion of each jacket is then connected by a suitable flue with a stack. Any convenient stack about the establishment in which my invention is used may be utilized for this purpose; but a high stack will manifestly produce better results, particularly if such stack be already utilized for the escape of hot gases into the atmosphere. This will greatly increase the rapidity of the air-currents through the jackets. By this means I produce a rapid circulation of air through all of the jackets or through any one or more of them at will and to practically any extent desired. I am thus enabled to carry away the heat radiated from the outside of the furnace-wall so rapidly and effectually that it enables me to use successfully a much thinner wall of refractory material than would otherwise be possible.

I prefer to use a magnesite lining in, for instance, a converter that is eighteen inches in thickness where ores or mattes are treated that contain iron, because this basic lining will successfully resist the corrosive action of the iron for a long period. If white metal or

blister copper be treated in the vessel, I prefer that the lining shall be composed of acid or silica brick. Such acid material may be placed there in plastic form, if preferred.

My object in using preferably narrow air-jackets—say twelve inches in width—is so that I may thus be enabled to vary the cooling air-currents at different portions of the vessel. For instance, I have found in practice that certain portions of a furnace-wall may become intensely hot and may require cooling, while other portions of the same wall may remain cool, so that they do not require the cooling influence of the air-currents.

In the case of converters I preferably divide, by means of a suitable partition or otherwise, the narrow air-jackets at the bottom of the vessel, and I preferably provide separate inlets for the air-currents to each side, so that I can deliver cooling-currents to either or to both sides of the vessel at will. By this means I effectually control the travel of heat through the refractory walls of the vessel, and I can do this practically without expense through the medium of the draft produced automatically by a high stack.

Among the advantages that I claim for my invention, briefly stated, may be mentioned the following:

First. I avoid the use of heavy weights such as the solid-block converter demands.

Second. I am enabled to effectually control and to regulate the travel of the heat through the walls without the use of water-jackets, which latter are objectionable because of the expense of a water-supply and because of the danger of having water near to molten matte or molten slag.

Third. I prevent by this invention the extensive saturation of the walls of the vessel with copper, gold, and silver, which results from the use of very thick refractory walls and which causes in ordinary smelter plants an unnecessary investment of one hundred and fifty thousand dollars and necessitates a heavy expense to recover the same when a furnace is dismantled.

Fourth. I avoid the expense of producing an air-blast where this is used as the cooling agent in jackets and which I have found is difficult to regulate to the exact heat requirement of the walls at all times and which may not be available at a time when the walls demand the cooling influence.

Referring now to the drawings, 2 represents the outside metallic air-jackets.

3 illustrates the refractory furnace or converter-wall.

4 in Fig. 1 illustrates the partition in the lower portion of the air-jackets as a means of producing separate cooling air-currents on both sides of the vessel.

5 represents the air-inlets, and 5′ the means for opening and closing them.

6 represents the flues or air-passages for collecting and assembling the air-currents from the various individual jackets.

7 in Fig. 2 represents the flue or draft-channel that conducts the air from the separate jackets from the flues 6 to the stack, which is not shown.

The dimensions of the jackets, flues, &c., as given in the drawings, are intended simply to illustrate the true intent of my invention. These air-passages may be larger or smaller to suit the requirements of special work.

If preferred, an induced draft may be used in lieu of a stack without departing from the spirit of my invention; but I prefer to use a stack for reasons of economy.

Doubtless many modifications in the detailed arrangement of this apparatus will suggest themselves to those skilled in the art without departing from the spirit of my invention, since

What I claim is—

1. The combination of a converter, and a series of separate, adjacent, metal air-jackets forming an exterior casing for said converter.

2. The combination of a converter, and a series of separate, adjacent, narrow metal air-jackets forming an exterior casing for said converter, each jacket provided with a controlling-valve.

3. The combination of a converter, a series of separate, adjacent, metal air-jackets forming an exterior casing for said converter, and means for creating an induced draft through said jackets.

4. The combination of a converter, a series of separate, adjacent, metal air-jackets forming an exterior casing for said converter, each jacket provided with a controlling-valve, and a stack connected with said jackets.

5. The combination of a converter, a series of separate, adjacent, narrow metal air-jackets forming an exterior casing for said converter, each jacket provided with a controlling-valve, a stack, and a flue connecting said jackets and stack.

In testimony whereof I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:

AZELLE E. HOBART,

WILLIAM M. KIRKPATRICK.