No. 870,925. PATENTED NOV. 12, 1907.

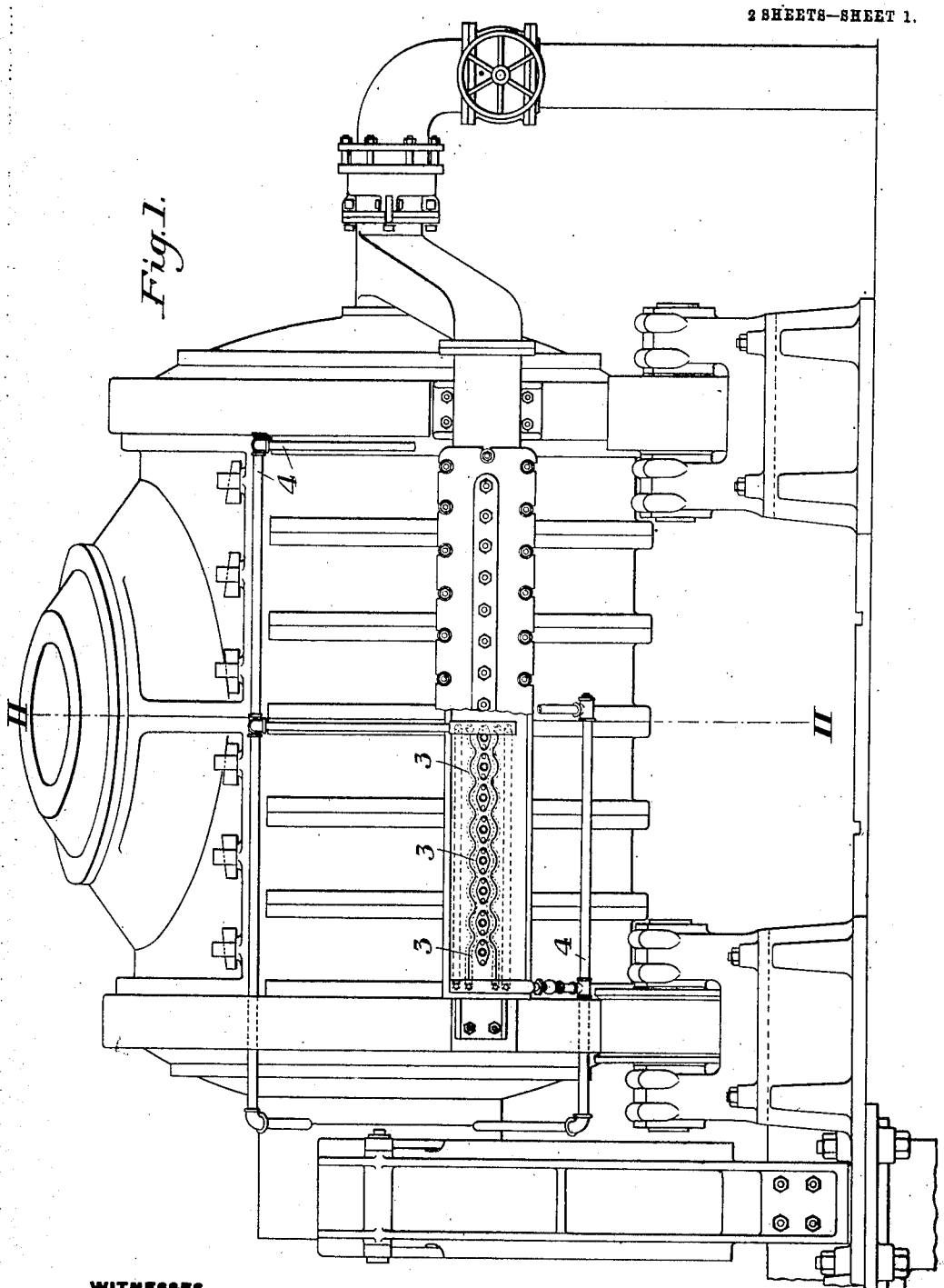
R. BAGGALEY.

CONVERTER.

APPLICATION FILED OCT. 30, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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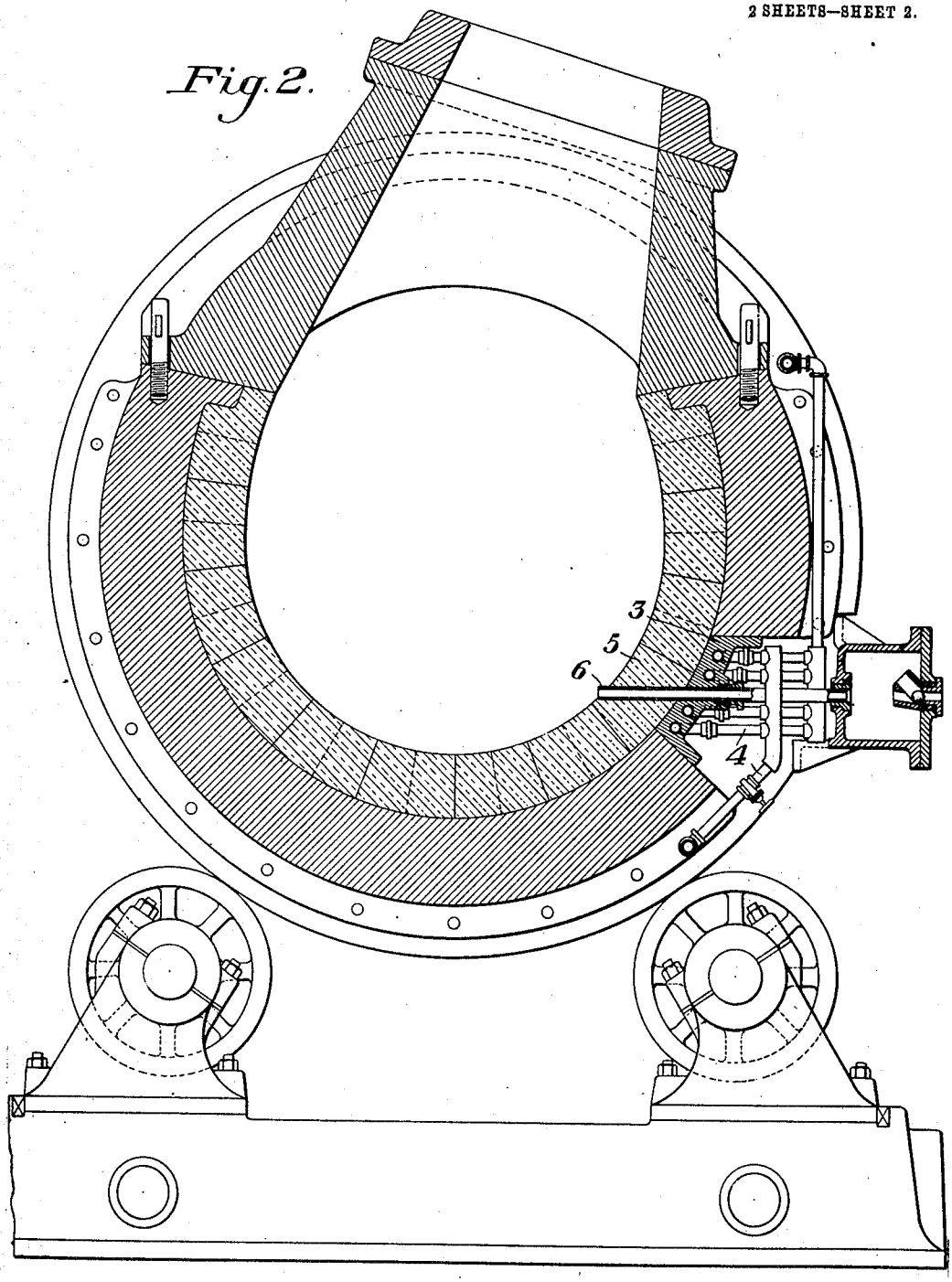
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

RALPH BAGGALEY, OF PITTSBURG, PENNSYLVANIA.

CONVERTER.

No. 870,925. Specification of Letters Patent. Patented Nov. 12, 1907.

Application filed October 30, 1906. Serial No. 341,338.

To all whom it may concern:

Be it known that I, RALPH BAGGALEY, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Improvement in Converters, 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 longitudinal elevation of a converter with the lid of the wind-box partially cut away in order to show a number of twyer entrances to which my present invention has been applied. Fig. 2 illustrates a cross-section of Fig. 1, on the line II—II.

My invention is an improvement on the apparatus illustrated and described in United States Patent No. 830,040, dated September 4th, 1906.

The fact has been developed by test, that if a basic lining be utilized say in the ordinary, sheet steel copper converter as commonly used, that it is only a comparatively short time until such basic lining will slough off and be entirely dissolved. These basic linings are very expensive, and unless some outside influence therefore be exerted for their protection, the cost of renewing same becomes so great as to seriously militate against the economy of their use.

The heavy metal blocks, illustrated and described in U. S. Patent No. 830,040, dated September 4th, 1906, and in other patents granted to me, were designed to protect the interior lining against ultimate destruction through corrosion. In my tests I have used apparatus embodying these heavy metal blocks for a period of eight months in daily and in almost continuous service and I thus found, by test, that these heavy blocks did protect the basic lining of the vessel, as expected, during the period stated, so that at the end of eight months of service the lining, generally speaking, was still intact and serviceable. My tests showed that when these heavy metal walls were protected by an interior basic lining, that the results generally speaking were entirely satisfactory.

On one occasion when blister copper had formed and when the twyer-punchers had failed to do their work properly, so that a mass of congealed copper formed on the interior wall of the lining, at the twyer entrances, the subsequent punching and opening of these twyers had the effect of somewhat loosening the basic lining and of separating it from a close contact with the interior metal wall. As a consequence the blast in large volume escaped between the lining and the outside metal walls and entered the converter at the top of the lining on one side of the vessel. It so happened that at the same time, while experimenting with a force of inexperienced workmen, that the vessel had been overcharged with matte so that the level of the molten bath was above the top of the interior basic lining. This combination resulted in a converting action against the side wall of the heavy, steel casting top or nose of the vessel. Within an hour's time this converting action resulted in dissolving a solid steel casting sixteen inches thick, so that the molten matte overflowed through the orifice thus formed, onto the twyer-box on the outside of the vessel.

Even when using the interior basic lining; at or near the blast entrance a steady destruction of the lining at this one point occurred. The lining at all other points of the vessel lasted apparently without injury for a period of eight months and it was still good and serviceable at that time, excepting only in the immediate vicinity of the blast entrance; indicating that a greater cooling influence at this one portion of the vessel was necessary in order to protect the lining from destruction.

Unsuccessful efforts have been made in the past to utilize basic linings in converters that were made in the ordinary way, of steel shells. The heavy steel blocks will exercise a restraining or protecting influence on the basic lining of that vessel; which safeguarded it in a manner almost equal to the cooling influence of outside water-jackets: with the one exception of that portion of the vessel in the immediate vicinity of the blast entrance, and in order to utilize a basic lined vessel composed of heavy metal blocks it is essential to success to materially increase the cooling and the protecting influence on the lining at this one point.

It is my belief that the destruction of the lining in this vessel at the blast entrance only, is not alone due to increased heat in the matte, through oxidation, at this one point, or through a mechanical wash and grinding of the molten matte through the violent ebullition at this point of the entering blast while acting on the matte, but that the situation is aggravated by twyer-punching and by the presence of joints in the masonry wall at this portion of the lining. This explanation however will not account for the trouble entirely. It was quite manifest that a greater corrosion occurred in the lining at the twyer entrance alone, than at any other portion of the lining.

My present invention is designed to correct this trouble and to make it possible, in future, to economically utilize apparatus composed of heavy metal blocks so that the lining at the blast entrance, or in other words, at the twyer ends on the interior of the vessel will last quite as long as it has been proven to last at other portions of the interior of the vessel.

Referring now to the drawings: 3, 3, 3, 3 represent water-cooled twyer blocks, which back up the lining at or near each twyer entrance. These twyer blocks are provided with one or more water pipes 4, each preferably supplied with an adjusting cock so that the flow of water through the pipes may be regulated at will. By my present invention I am enabled to exercise a much greater cooling influence at the rear or outside portion of the lining and to increase or decrease

this cooling influence at will. In this manner I can regulate and place a limit on the corrosive action on the lining at this point of the vessel at will.

5 in Fig. 2 illustrates a large special block, which constitutes a portion of the interior lining, and made of such size that the twyer can pass through the center of it, to the interior of the vessel, without any broken joints in the masonry. The twyer orifice is preferably made of a seamless brass tube 6, in order to protect this block against breakage or wear from the punching bars. This heavy block prevents mechanical fracture of the lining while punching, and being a solid block of basic material its conductivity is increased and the cooling influence of the water-block is therefore augmented over that of a masonry wall made up of smaller pieces.

Many modifications will naturally suggest themselves to those skilled in the art, without departing from the spirit of my invention, since

What I claim is:—

1. A copper converter composed of a refractory lining, heavy metal blocks forming the exterior walls, and a water-cooled twyer block inset into the metal blocks and against the outer surface of said lining adjacent to and around the twyer orifice; substantially as described.

2. A copper converter composed of a refractory lining and having metal blocks forming the exterior walls, a twyer block forming a backing for said lining adjacent to the twyer entrance, a plurality of separate cooling passages in said block, and means for individually controlling the circulation through the different passages; substantially as described.

3. In a copper converter, a basic lining having a twyer entrance formed through the central portion of a single, solid, lining block, and a water-cooled block exteriorly of the said lining block and forming a backing for the same; substantially as described.

4. A copper converter composed of heavy metal exterior walls, and a basic lining, said lining having a larger block through the central portion of which a twyer orifice is formed, and a water-cooled block applied to the exterior of the lining adjacent to the twyer; substantially as described.

In testimony whereof, I have hereunto set my hand.

RALPH BAGGALEY.

Witnesses:
ELSIE M. HOPLER,
FREDERICK H. DAVIS.