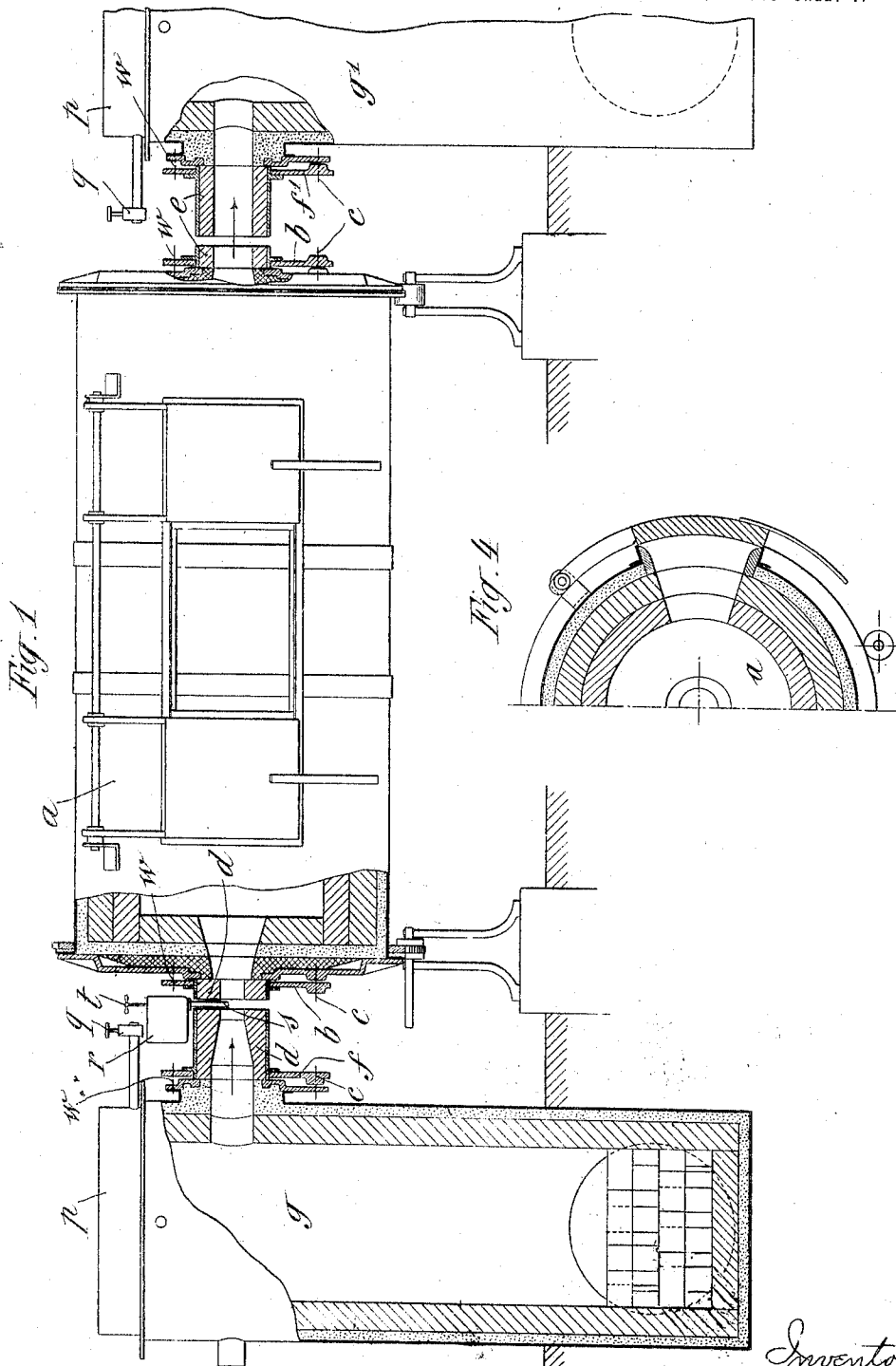


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 REGENERATIVE TIPPING FURNACE.  
 APPLICATION FILED OCT. 21, 1918.

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Patented May 27, 1919.

3 SHEETS—SHEET 1.

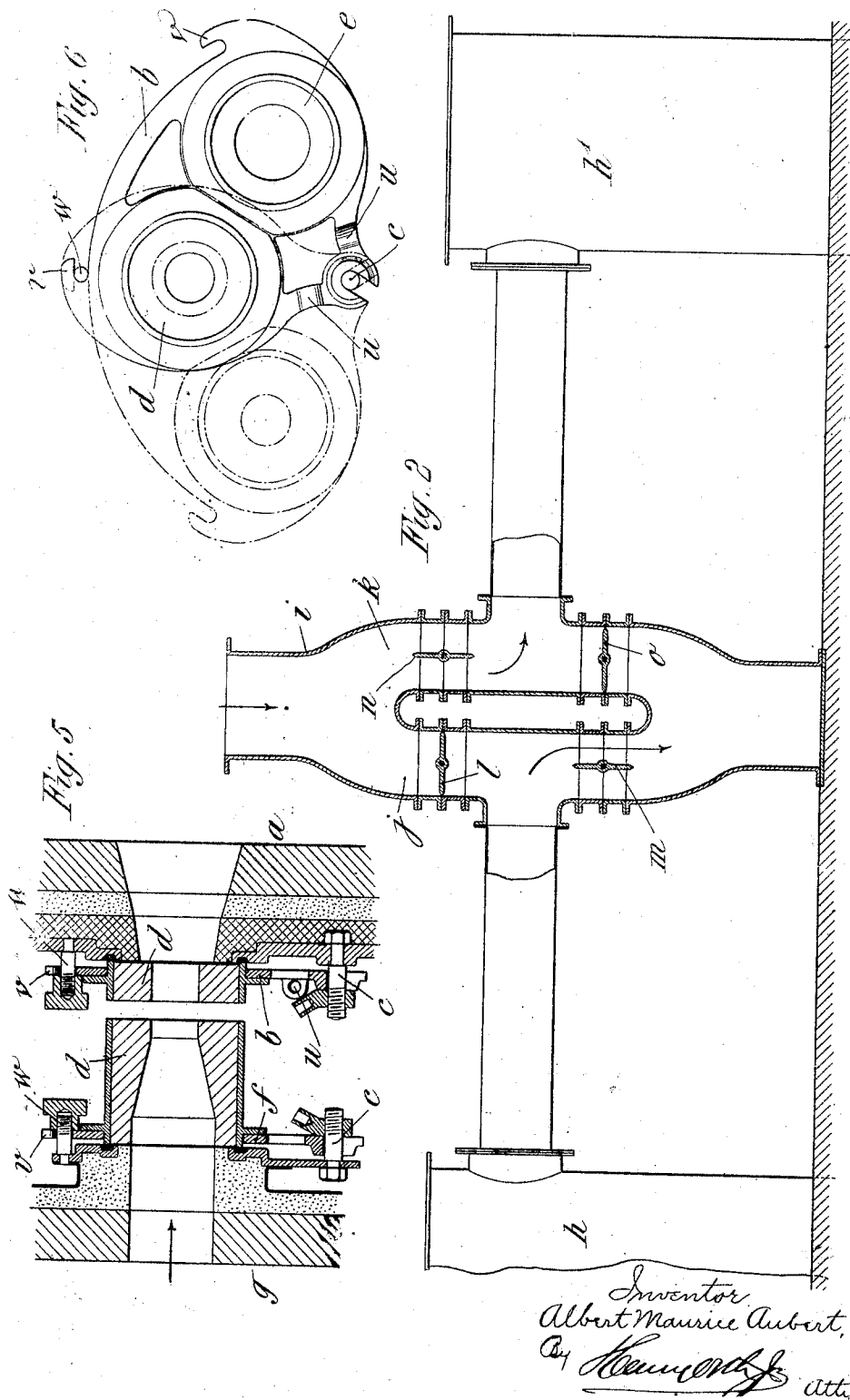


Inventor  
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 By *Henry J. [Signature]* atty

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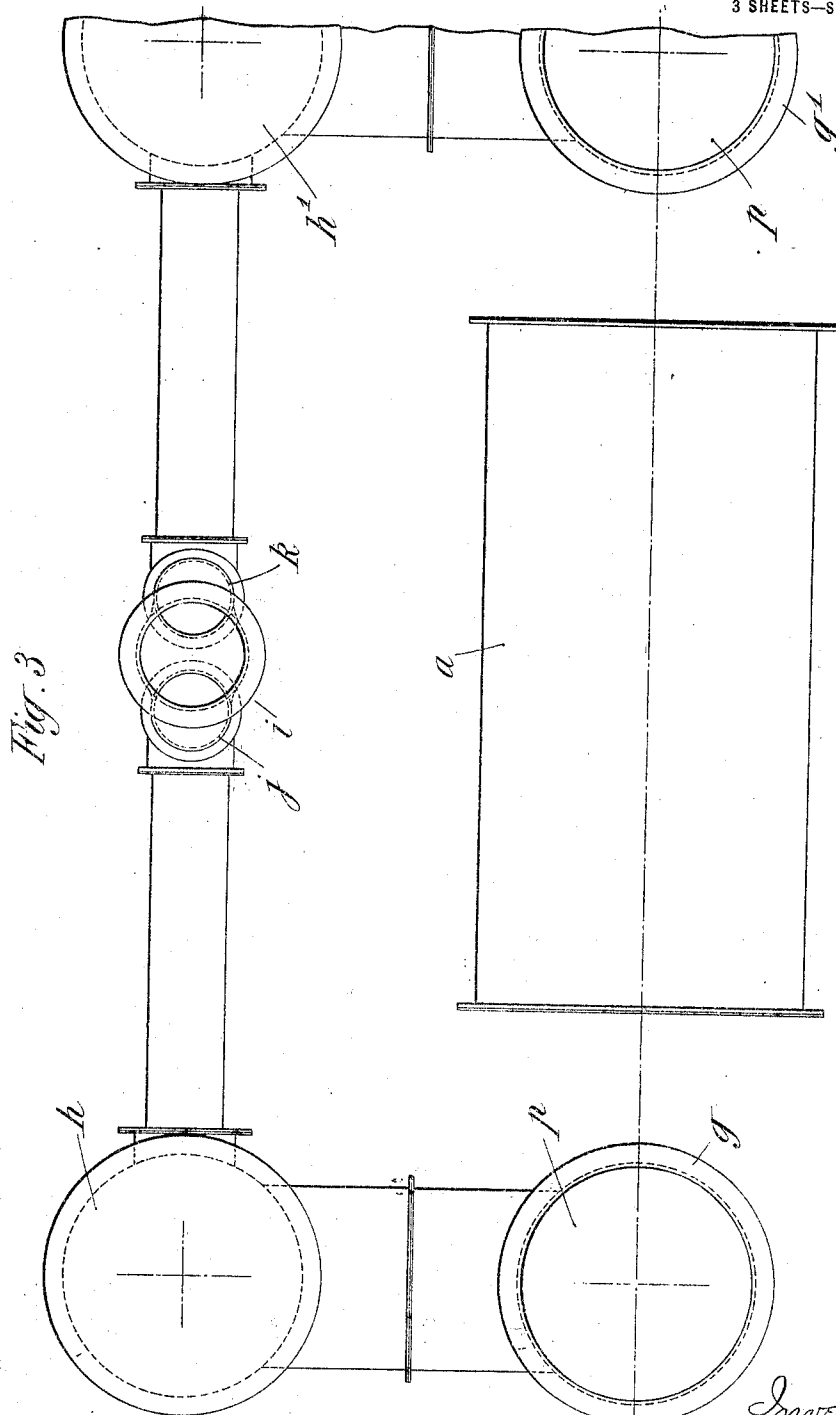


Fig. 3

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# UNITED STATES PATENT OFFICE.

ALBERT MAURICE AUBERT, OF BILLANCOURT, FRANCE.

## REGENERATIVE TIPPING FURNACE.

1,304,725.

Specification of Letters Patent. Patented May 27, 1919.

Application filed October 21, 1918. Serial No. 258,393.

To all whom it may concern:

Be it known that I, ALBERT MAURICE AUBERT, citizen of the Republic of France, and resident of 3 Rue de la Ferme, Billancourt, (Seine,) in the said Republic, engineer, have invented certain new and useful Improvements in Regenerative Tipping Furnaces; 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 appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The invention refers to high temperature furnaces of the kind where the body of the furnace or the furnace proper is attached to heat regenerators in which inversions of the gaseous currents are effected from time to time.

The object of the invention is to utilize the heat to a better effect than usually, and on the other hand to enable each time when the current is reversed, to readily substitute an inlet orifice for an outlet orifice, and vice versa, both for the furnace body and for the regenerators. The orifices of the regenerators and of the furnace body are constructed according to the invention which forms the subject of my prior application for patent, Serial No. 230996, dated the 26th of April, 1918, there being no material junction between each outlet orifice and the corresponding inlet orifice, the joint being formed only by the ambient air.

With these objects in view, the invention consists of appliances which will be described below and which are shown on the annexed drawings.

Figure 1 of the drawings is a longitudinal elevation, partly in section of a tipping furnace and the regenerators situated in the same axis, these two elements of the general arrangement of the furnace being provided with movable lunettes which carry diaphragms in which are arranged the inlet and outlet orifices.

Fig. 2 is a longitudinal elevation of the installation with the reverser in section, the body of the furnace being removed.

Fig. 3 is a plan view of the installation.

Fig. 4 is a transverse half-section of the furnace body.

Fig. 5 is a detail view in vertical longitudinal section and to a larger scale, showing the diaphragms, on one of the regenerators and at one of the extremities of the furnace, and through which the hot air is admitted into the latter.

Fig. 6 is a front view of one of the lunettes mounted on the furnace and shown in full lines in the same position as on Fig. 5, while the chain lines indicate the reverse position.

As will be seen from these drawings, at each extremity of the furnace proper *a*, there is placed a lunette *b* which can oscillate around an axis *c* below the orifice of the furnace, and which carries two diaphragms *d* and *e*, the first of which has an orifice with a cross section and a longitudinal section suitable for the admission of hot air into the furnace, while the orifice of the second one is suitable for the outlet.

A similar lunette *f* or *f*<sup>1</sup> provided with two different diaphragms, one for the inlet and one for the outlet, is mounted on each of the regenerators *g*, *g*<sup>1</sup>.

It is thus sufficient to tilt the two lunettes of the furnace as well as the lunette of each of the regenerators which communicate directly with it through an air joint, in order that all the inlet and outlet orifices may have the new cross section and longitudinal section which are suitable when an inversion of current is effected.

The reversing device used is clearly indicated in the drawings.

Each of the regenerators *g*, *g*<sup>1</sup> located in the axis of the furnace, communicates with another regenerator *h*, *h*<sup>1</sup> in which the air undergoes a first heating, and both of these regenerators *h* and *h*<sup>1</sup> communicate with a reverser *i* which receives at its upper part, for instance, the air sent by the fan, while it communicates through its lower part with the chimney.

In its middle portion, the reverser is divided into two branches, *j*, *k*, one of which communicates with the regenerator *h* and the other with the regenerator *h*<sup>1</sup>, and in each of these branches are placed two valves *l*, *m*, or *n*, *o*.

If, for instance, the valves *m*, and *n* are opened, and the valves *l* and *o* are closed,

as indicated in Fig. 2, the air will pass, in order to enter the furnace, through the regenerating chambers  $h^1$  and  $g^1$  and the gaseous products will issue from the furnace and pass through the regenerators  $g$  and  $h$ . The opposite will take place if the valves are placed in the inversed position (see Fig. 1).

In the drawings, it is assumed that a furnace is heated by pitch. On each of the regenerators,  $g$  and  $g^1$ , there is accordingly mounted a heating reservoir  $p$  for this material and to which is connected a filter,  $q$ , and a reservoir  $r$  of filtered pitch, which distributes that fuel through an admission pipe  $s$  and is provided with a controlling cock  $t$ .

The lunettes provided with diaphragms  $b$ ,  $b^1$ ,  $f$ ,  $f^1$  (see Figs. 5 and 6) are sectors of cast iron furnished with sheet iron sockets  $d$ ,  $e$  suitably lined with refractory material in order to obtain an orifice of the desired section. These lunettes swing around an axis  $c$  situated below the orifice of the furnace or of the regenerator to which they belong, sockets  $u$  being provided into which two workmen insert bars in order to make them swing gently during the inversions of the currents. At the top they are provided, to the right and to the left, with a lug  $v$  which abuts against a pin  $w$  at the end of their stroke in one direction or the other. In order to be able to fix them in the position to which they have been brought, their pivots and their abutment pins are screw threaded and provided with nuts.

The operation is as follows: If the valves  $l$  and  $o$  (Fig. 2) are opened, and valves  $m$  and  $n$  are closed, air is directed to the hot regenerators  $h$  and  $g$  in series. The smaller opening  $d$  of the lunette  $f$  for regenerator  $g$  at the left of Fig. 1, as well as the smaller opening to the furnace of the similar lunette  $b$ , are placed in position. Valve  $t$  is opened to allow the flow of filtered pitch from the reservoir  $r$  through pipe  $s$  into a current of hot air from regenerator  $g$  into the furnace  $a$ . The pitch burns in the furnace, and the hot gaseous products of combustion issue from the opposite ends of the furnace through the larger orifices  $e$  (which have previously been positioned) in lunettes  $b^1$  and  $f^1$ . These products of combustion then pass to regenerators  $g^1$  and  $h^1$  through open valve  $o$  to the stack. When the positions of the valves  $l$ ,  $m$ ,  $n$ ,  $o$ , are reversed, assuming the positions shown in Fig. 2, the lunettes  $b$ ,  $b^1$ ,  $f$ ,  $f^1$ , are reversed; the flow of pitch is cut off at  $t$ , and a like flow established at the opposite end of the furnace from a like reservoir, not shown.

Having thus described my invention and the best means I know of carrying the same into practical effect, I claim:—

1. A furnace having a port at each end, a regenerator at each end of the furnace having ports opposite the ports of the latter,

means for passing a gaseous current through the furnace and regenerators by way of the ports, means for reversing the direction of said current, and diaphragms interposed between the ports of the furnace and regenerators, each having a plurality of apertures adapted to be selectively arranged to register with the ports of the furnace and regenerators, for the purpose specified.

2. A furnace having a port at each end, a regenerator at each end of the furnace having ports opposite the ports of the latter, means for passing a gaseous current through the furnace and regenerators by way of the ports, means for reversing the direction of said current, and diaphragms interposed between the ports of the furnace and regenerators, each having apertures of different diameters adapted to be selectively arranged between the ports of the furnace and regenerators, for the purpose specified.

3. A furnace having ports at its opposite ends, regenerators having ports opposite the ports of the furnace, means for passing a gaseous current through the furnace and regenerators, means for reversing the direction of said current, and means whereby conduits of different diameters are brought into communication with the ports of the furnace and regenerators, for the purpose specified.

4. A furnace having ports at its opposite ends, regenerators having ports opposite the ports of the furnace, means for passing a gaseous current through the furnace and regenerators, means for reversing the direction of said current, means whereby two conduits connect the port of one regenerator with the one port of the furnace, and means whereby two conduits connect the other port of the furnace with the port of the other regenerator, the diameter of one pair of conduits being greater than the diameter of the other pair of conduits, for the purpose specified.

5. A furnace having ports at its opposite ends, regenerators having ports opposite the ports of the furnace, means for passing a gaseous current through the furnace and regenerators, means for reversing the direction of said current, means whereby two disconnected conduits connect the port of one regenerator with one port of the furnace, and means whereby two disconnected conduits connect the other port of the furnace with the port of the other regenerator, the diameter of one pair of conduits being greater than the diameter of the other pair of conduits, for the purpose specified.

6. A furnace having ports at its opposite ends, regenerators having ports opposite the ports of the furnace, means for passing a gaseous current through the furnace and regenerators, means for reversing the direction of said current, means whereby two disconnected conduits connect the port of one

regenerator with one port of the furnace,  
and means whereby two disconnected conduits connect the other port of the furnace  
with the port of the other regenerator, and  
5 means for feeding a carbonaceous fuel to the  
hiatus in each pair of conduits.

In testimony that I claim the foregoing as

my invention, I have signed my name in  
presence of two subscribing witnesses.

ALBERT MAURICE AUBERT.

Witnesses:

JOHN F. SIMONS,  
CHARLES ALT.