



US009187799B2

(12) **United States Patent**
Wilson et al.

(10) **Patent No.:** **US 9,187,799 B2**
(45) **Date of Patent:** **Nov. 17, 2015**

(54) **20 BAR SUPER QUENCH VACUUM FURNACE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 455 days.

(21) Appl. No.: **13/573,001**

(22) Filed: **Aug. 13, 2012**

(65) **Prior Publication Data**

US 2014/0042678 A1 Feb. 13, 2014

(51) **Int. Cl.**

C21D 1/773 (2006.01)

C21D 9/00 (2006.01)

(52) **U.S. Cl.**

CPC **C21D 9/0043** (2013.01); **C21D 1/773** (2013.01); **C21D 9/0062** (2013.01)

(58) **Field of Classification Search**

CPC **C21D 1/767**; **C21D 9/0043**; **C21D 1/06**; **C21D 1/773**; **C21D 9/0062**; **F27B 5/16**;

F27D 2005/16; **F27D 2005/167**; **F27D 7/04**

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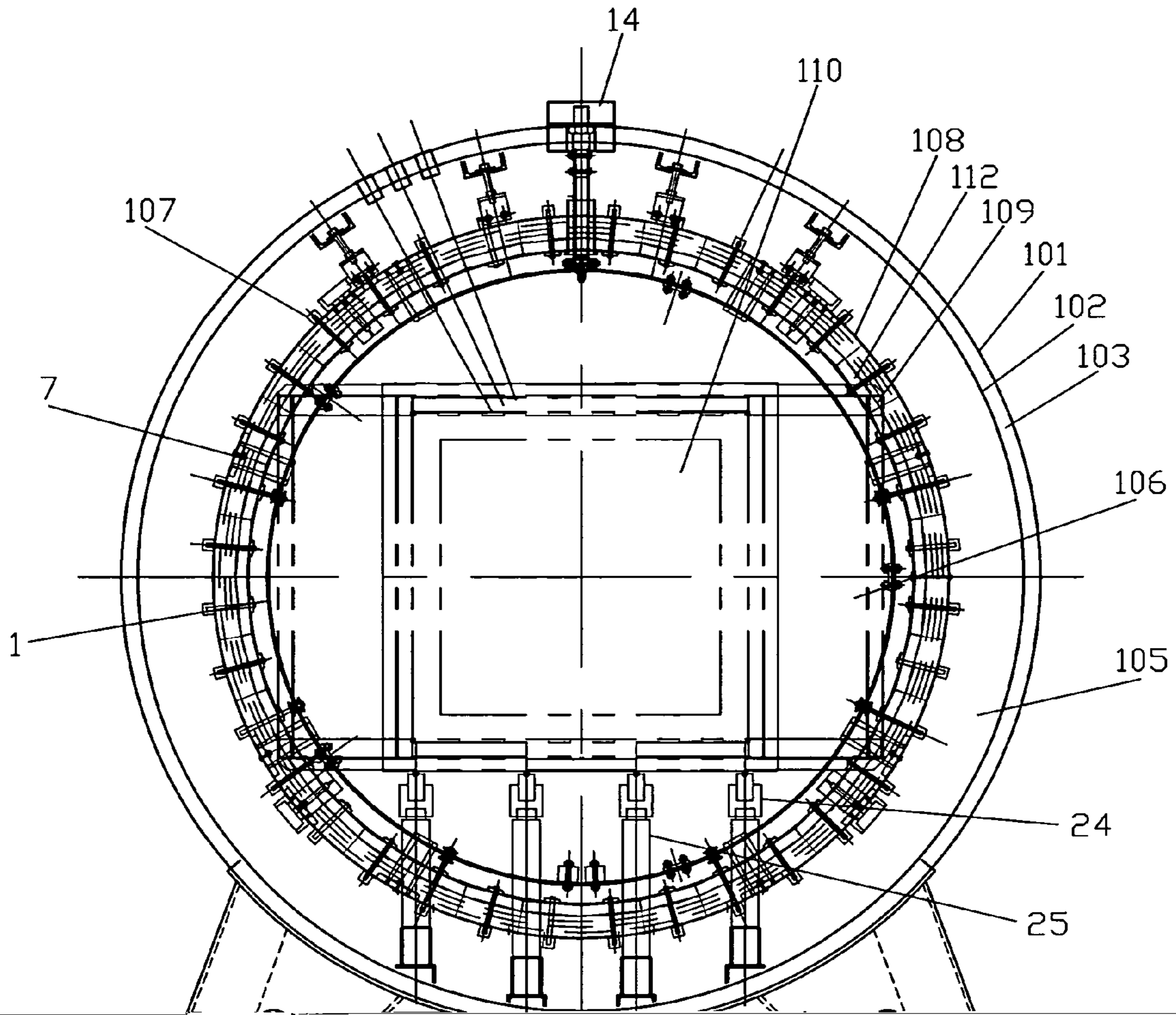
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(57) **ABSTRACT**

A vacuum furnace for heat treating and rapid gas quenching insitu a work piece at pressures up to 20 Bar and high gas velocities. The furnace comprises a single chamber having an inner portion including a plurality of graphite heating ele-



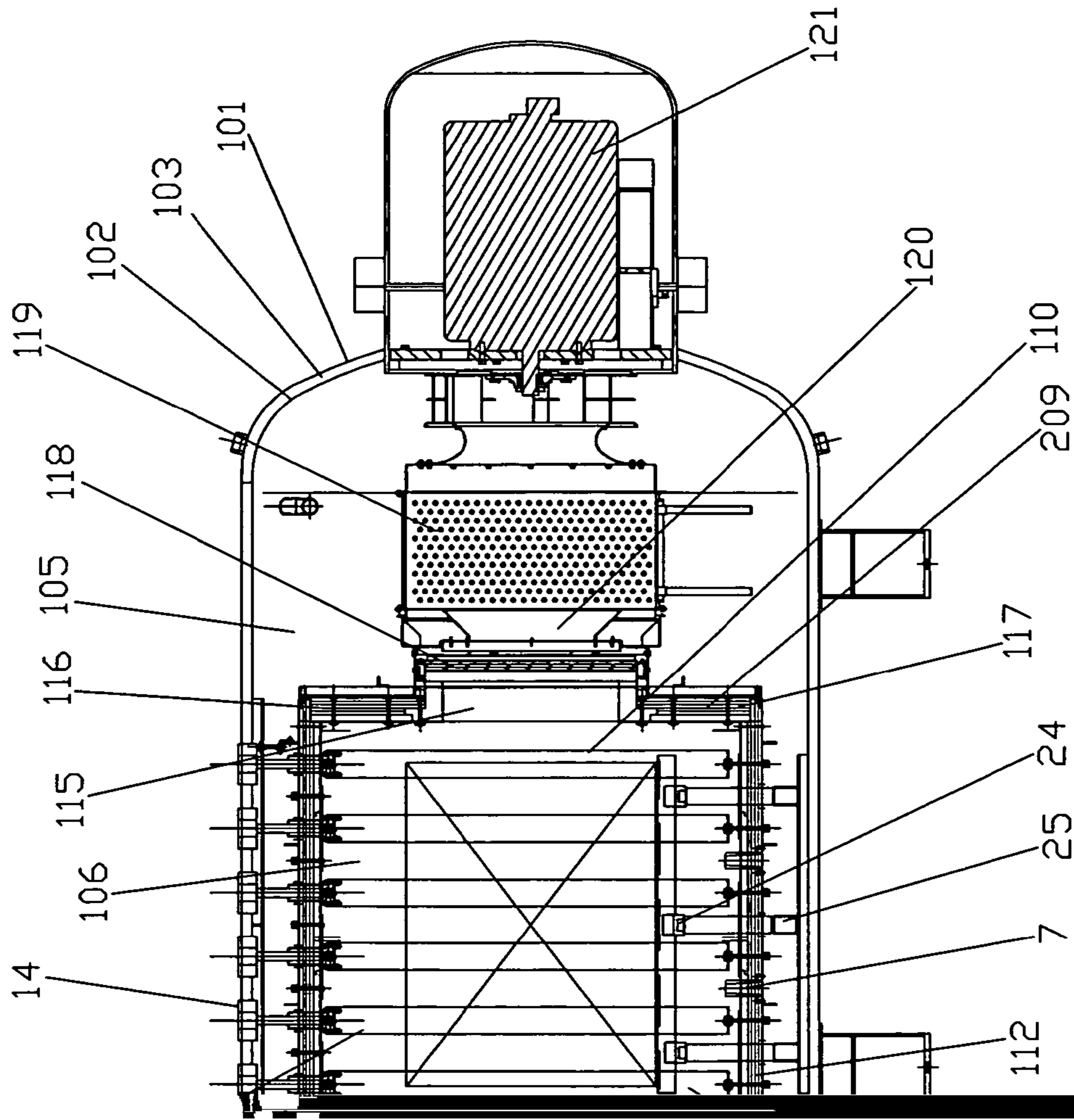
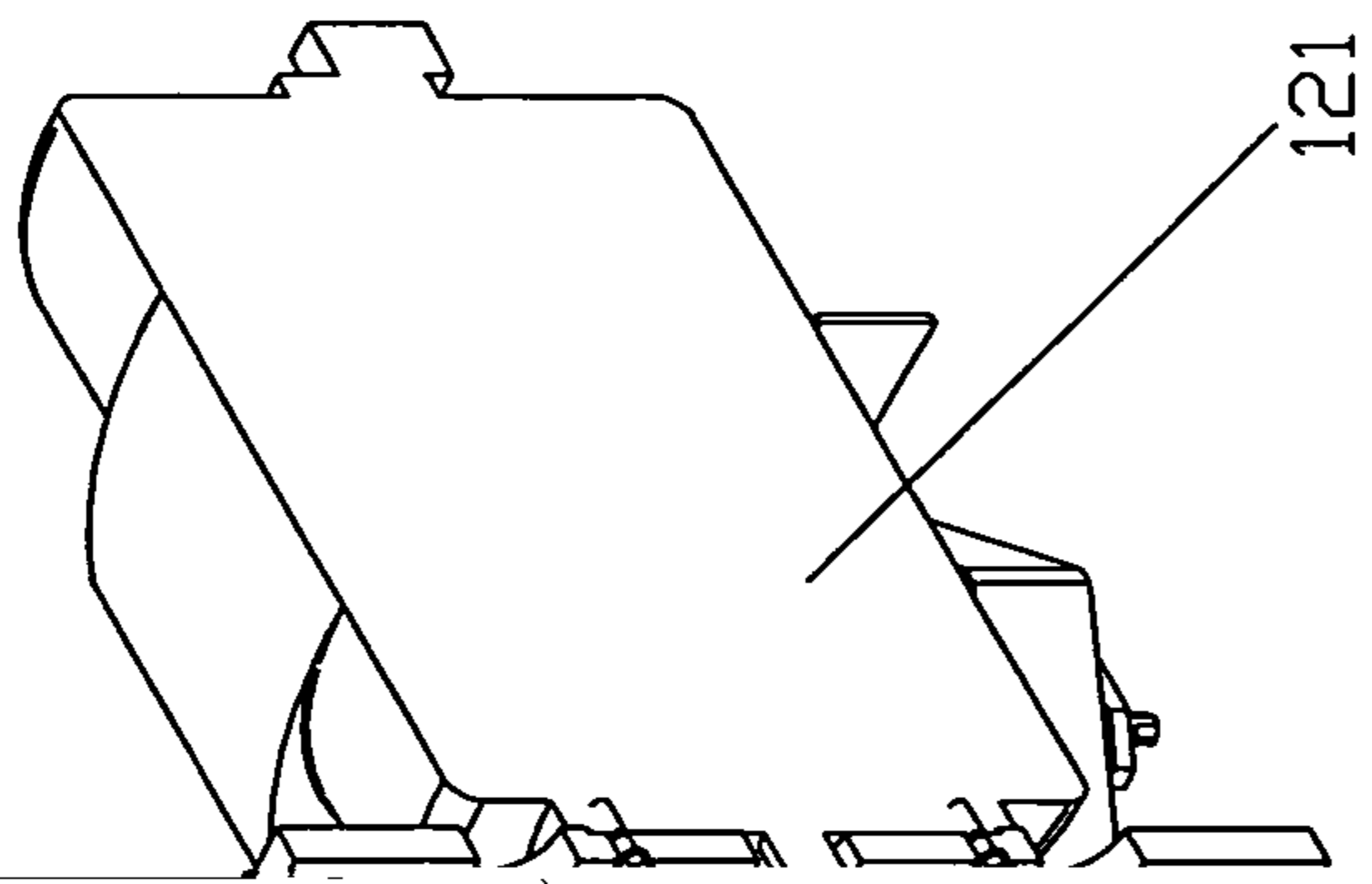
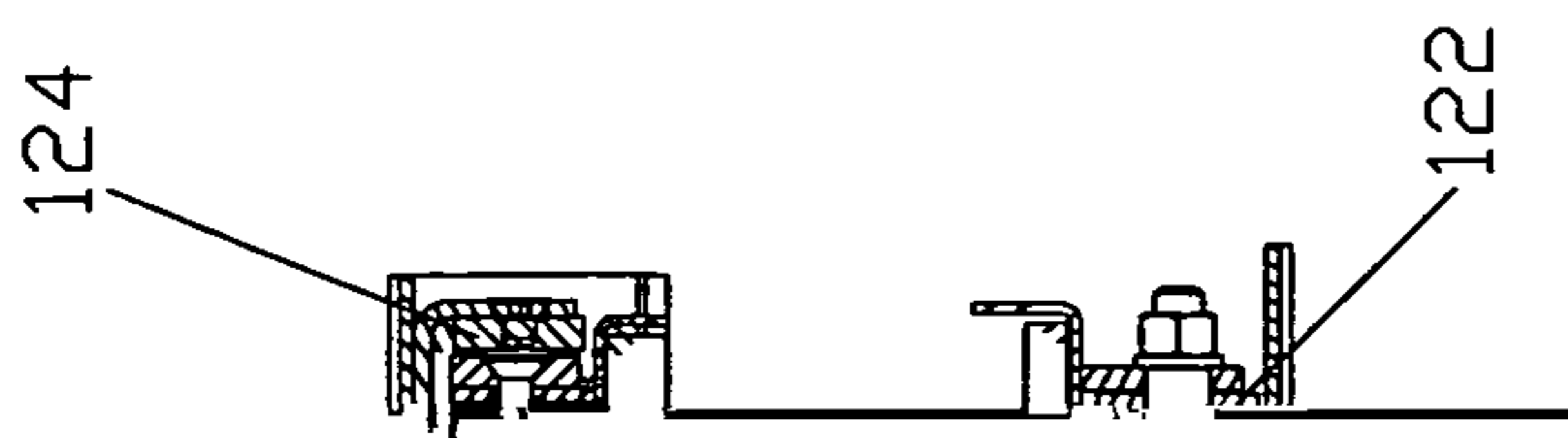


FIG. 2





7,514,035—that the fixed baffle design with gas recirculation systems and mammoth ducts helps prevent pressure drops—this design has its limitations, as much higher gas pressures

1. Field of the Invention

The present invention relates to a horizontal, single chamber front loading vacuum heat treating furnace capable of rapidly cooling the heat treated materials by insitu gas quenching at pressures up to 20 Bar and gas velocities approaching 200 miles/hour in a single chamber of the furnace.

2. Description of the Prior Art

The need for “green” environmentally friendly quenching capabilities has challenged furnace engineers to design fur-

5 gas pressures up to 20 Bar without loss of cooling gas velocity due to high pressure drops, a new design for flow of hot gas to the heat exchanger and recirculation fan was required. The present design is an improvement over the teachings in U.S. Pat. No. 7,514,035 and in the other prior art references mentioned above.

10 The design and teachings of the present invention result in the ability to achieve high pressure quenching up to 20 Bar with gas cooling velocities approaching 200 miles/hour, thereby rapidly cooling the work piece by diffusing the gas

3

blower means, and the baffle means further serving as a radiation barrier between the inner portion hot zone and the heat exchanger means.

4

elements 1, which is further backed by at least three layers of 0.5 inch high purity graphite felt and a heat-reflecting graphite foil (not shown) approximately 0.38 mm thick (0.015 inches) all attached to the inner wall of foil 108. Graphite

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a partial front, open door

FIG. 1 depicts in perspective a partial front, open door

20 Bar in order to prevent deterioration of the insulating material from such high pressures and impingement from the high velocity cooling gases. Heating elements 1 are con-

FIG. 14 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100 D-11-100

7

in the art will recognize that other and further modifications may be made thereto without departing from the spirit and scope of the invention. It is therefore intended to claim all such embodiments that fall within the true scope of the invention.

What is claimed is:

1. A vacuum furnace operating in excess of 10 Bar pressure for heat treating and rapid gas quenching a work piece in the same furnace comprising a single chamber and access means, said chamber being segregated into an outer portion and an inner portion, said inner portion of said chamber being a hot zone and being adapted to receive the work piece to be heat treated through said access means, the furnace further comprising movable door means in said chamber outer portion in

8

5 5. A vacuum heat treating furnace in accordance with claim 1 further comprising diffuser means in proximity to said chevron configuration baffle means and said heat exchanger means for further diffusing the convective hot gases passing through said opening and distributing the convective heat energy evenly over the full surface area of said heat exchanger means.

10 6. A vacuum heat treating furnace in accordance with claim 1 wherein the furnace further includes roller means and track means, and wherein said movable door means are operably connected to said roller means and said track means.

7. A vacuum heat treating furnace in accordance with claim 6 wherein the furnace further includes guide means, and