Sept. 3, 1946. C. H. WEST 2,407,047

FURNACE CLOSURE

Filed Oct. 20, 1944 2 Sheets-Sheet 1

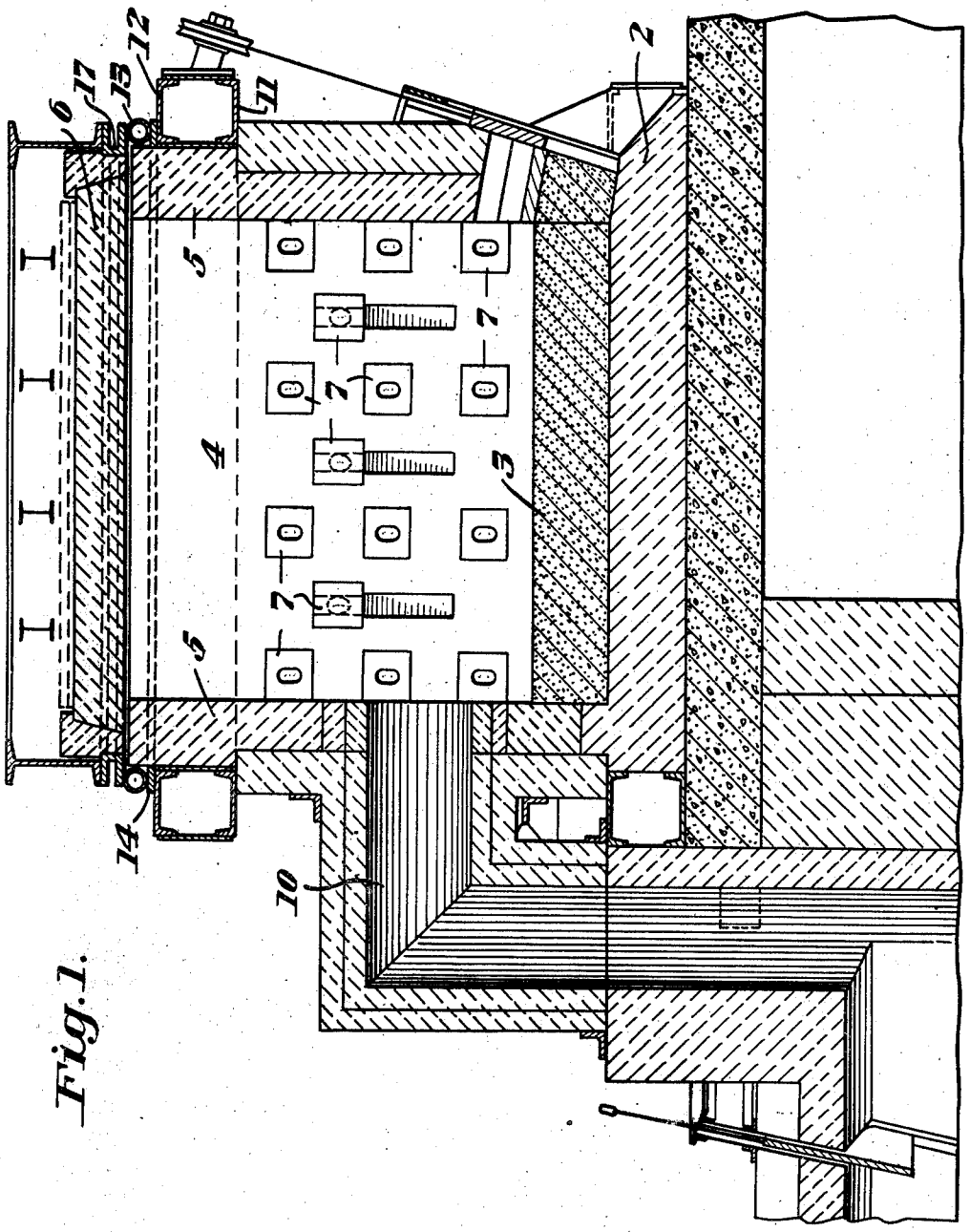


Fig. 1.

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Fig. 2.

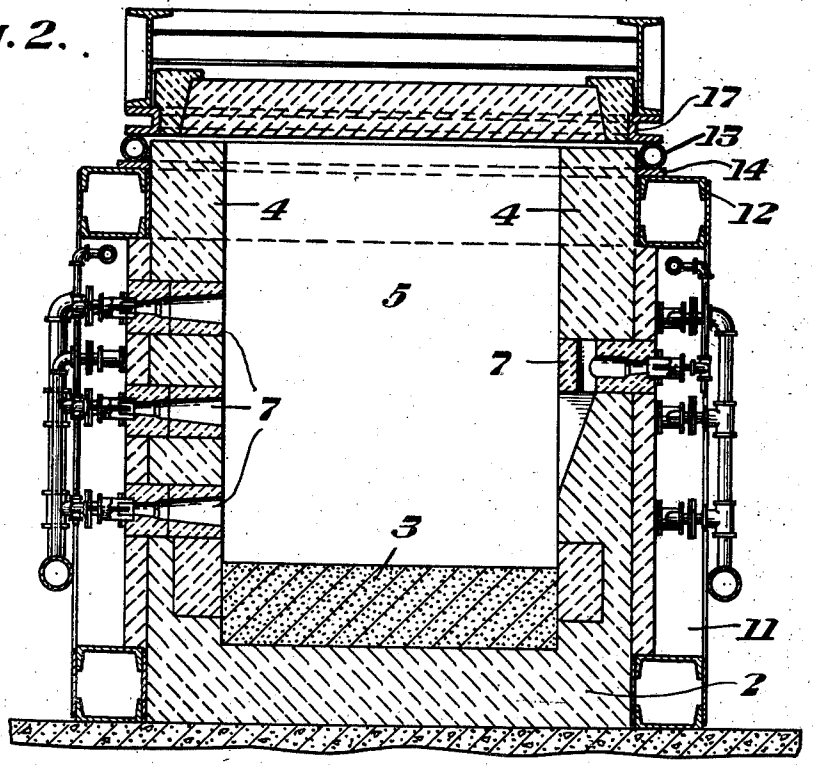
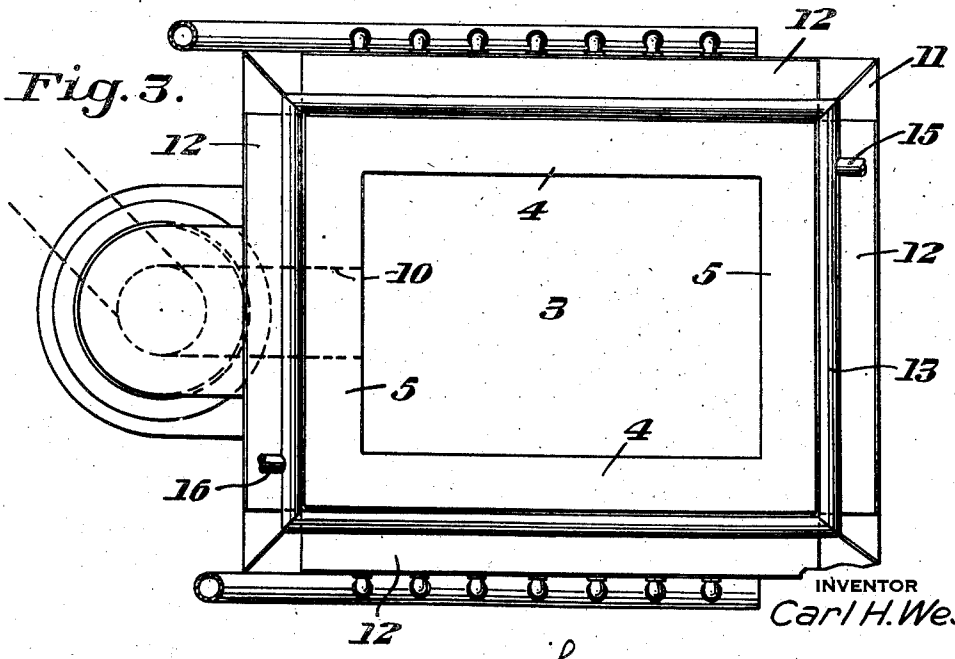


Fig. 3.



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UNITED STATES PATENT OFFICE

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FURNACE CLOSURE

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Application October 20, 1944, Serial No. 559,501

5 Claims. (Cl. 266—31)

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The present invention relates to furnace closures and particularly to closures for heating furnaces provided with cover-closed openings whereby the furnace is substantially or effectively sealed. The invention relates particularly to means cooperating with the cover for closing a furnace opening whereby to effect a tight closure but in an extremely simple way and at low cost.

The invention is especially applicable to heating furnaces such, for example, as furnaces for heating ingots. An ingot heating furnace is disclosed and claimed in my copending application Serial No. 559,500, a similar furnace being shown in the drawings of the present application. My closure is, however, applicable to old style soaking pits and generally to furnaces which are openable at the top for the admission and withdrawal of material to be heated or treated.

It is customary to seal heating furnaces of the type in question by the use of sand or water seals. Such seals are at best unsatisfactory in that they are unreliable in operation and difficult to maintain. They cause numerous well-known troubles and annoyances to operators, yet sand and water seals, particularly the former, have prior to the present invention been considered most satisfactory for the sealing of heating furnaces.

I provide a furnace closure which obviates the disadvantages of the devices heretofore available and accomplishes improved results in an extremely simple way and at remarkably low cost. I provide a closure for a furnace having an opening and a cover for the opening comprising a pipe extending about the opening and engaging the furnace and positioned to be engaged by the cover to close the opening when the cover is in place and means for cooling the pipe from the interior thereof. The pipe is preferably arranged as a closed figure of the same shape as the opening or rim of the furnace and is arranged relatively to the furnace opening or rim so that when the cover is moved into closed position the opening will be substantially closed or sealed. Means are provided for cooling the pipe or conduit interiorly, as, for example, by circulating cooling fluid therein.

I further provide a furnace comprising a chamber defining portion having an opening therein, a cover for closing the opening and an internally cooled conduit extending about the opening in position to be engaged by the cover to close the opening. I still further provide a furnace comprising a supporting structure, heat resisting means defining a chamber having an opening, a conduit extending about the opening supported

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by the supporting structure, a cover engaging the conduit when the cover is in place to close the opening and means for cooling the conduit on the interior thereof.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings, I have shown a present preferred embodiment of the invention, in which

Figure 1 is a vertical longitudinal cross-sectional view through a heating furnace,

Figure 2 is a vertical transverse cross-sectional view through the furnace, and

Figure 3 is a plan view of the furnace but with the cover removed.

Referring now more particularly to the drawings, the furnace is built upon a fundation 2 and comprises a hearth 3, side walls 4, end walls 5 and a cover 6 closing the furnace at the top. Burners 7 are mounted in the side walls 4. The gases are drawn off through an offtake 10.

The furnace is disposed generally within a supporting structure designated generally by reference numeral 11, the walls 4 and 5 projecting somewhat above such supporting structure. The supporting structure includes a back-up binding 12 surrounding the walls 4 and 5 near the upper ends thereof.

Surrounding the upper ends of furnace walls 4 and 5 and disposed above the binding 12 is a continuous hollow pipe or conduit 13. As shown in Figure 3, the conduit 13 consists of four lengths of straight pipe cut at 45° angles at their ends and welded together. The pipe or conduit 13 is arranged in a plane parallel to the plane of the binding 12 and also parallel to the plane of the top or rim of the furnace chamber. The upper surface of the conduit 13 is at an elevation slightly above the upper surface of the furnace walls, as shown in Figures 1 and 2. A structural member 14 is interposed between the conduit 13 and the binding 12. The conduit is mounted on the furnace supporting structure and not upon the refractory wall structure. Yet it surrounds the upper extremity of the refractory wall structure and is in thermo-conductive relation therewith so that when cooling fluid passes through the conduit it will cool not only the conduit itself, but by conduction through the conduit wall, the upper extremity of the refractory portion of the furnace and also, when the cover is in place, the portion of the cover which is in contact or proximity with the conduit. Cooling fluid is circulated

through the conduit 13 in any suitable manner, fluid inlet and outlet connections 15 and 16 being shown in Figure 3.

The cover 6 includes a peripherally extending metal portion 17 whose under-surface is smooth and which, as will appear from Figures 1 and 2, is adapted to rest on top of the conduit 13 when the cover is in place. The central portion of the cover is of refractory material as are the walls 4 and 5. The cover may be removed from and replaced on the furnace by any suitable means as well known in the art.

My closure structure is the essence of simplicity yet provides for an extremely satisfactory closure of the furnace. Its cost is a fraction of the cost of many relatively complex mechanisms heretofore employed for sealing furnaces. The pipe or conduit serves a four-fold function; first, it seals the furnace, second, it supports the cover, third, it cools the furnace rim about the opening therein, and, fourth, it cools the portion of the cover which is in contact and proximity with the pipe or conduit when the cover is in place. Since the conduit is carried by the furnace supporting structure it imposes no strain on the refractory part of the furnace, which may expand and contract independently.

While the conduit 13 may be of any desired structure and material, I prefer to employ heavy steel pipe and to cut the pipe in lengths and weld the lengths together at the corners as shown in Figure 3. I prefer to employ water as the cooling medium, although other cooling media may be used. The metal-to-metal contact between the conduit and the cover closely approaches a machine fit and provides a seal quite adequate for furnaces such as ingot heating furnaces or soaking pits. The troubles and annoyances incident to sand and water seals and the difficulties incident to maintenance of such seals are overcome.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A closure for a furnace having an opening and a cover for the opening comprising a pipe extending about the opening and disposed radially outside a portion of the furnace defining the opening and engaging the furnace and positioned to be engaged by the cover to close the opening when the cover is in place and means for cooling the pipe from the interior thereof.

2. A furnace comprising supporting structure, heat resisting means defining a chamber having an opening, a conduit extending about the opening supported by the supporting structure, a cover engaging and supported by the conduit when the cover is in place to close the opening and means for cooling the conduit from the interior thereof.

3. A furnace comprising supporting structure, heat resisting means disposed generally within the supporting structure and defining a chamber, the heat resisting means projecting beyond the supporting structure and at the projecting portion thereof having an opening therein, a conduit extending about said portion of the heat resisting means and supported by the supporting structure, a cover engaging the conduit when the cover is in place to close the opening and means for cooling the conduit from the interior thereof.

4. A furnace comprising supporting structure, heat resisting means defining an upwardly open chamber, a conduit extending about the chamber opening supported by the supporting structure, a cover supported by the conduit and substantially continuously engaging the same when the cover is in place to close the opening and means for cooling the conduit from the interior thereof.

5. A furnace comprising supporting structure, heat resisting means defining a chamber having an opening, a pipe extending about the opening supported by the supporting structure, a cover engaging the pipe when the cover is in place to close the opening and means for cooling the pipe from the interior thereof, the pipe being in thermo-conductive relationship with the rim of the heat resisting means about the opening.

CARL H. WEST.