Dec. 24, 1935. W. M. HENRY 2,025,165

METALLURGICAL FURNACE

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Fig. 1.

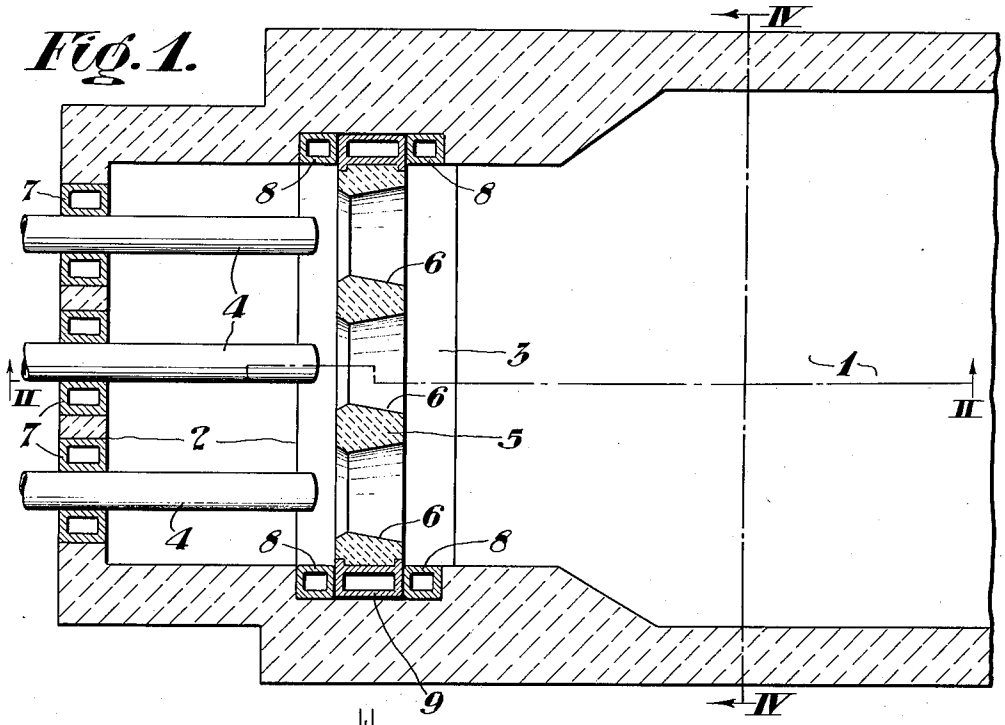
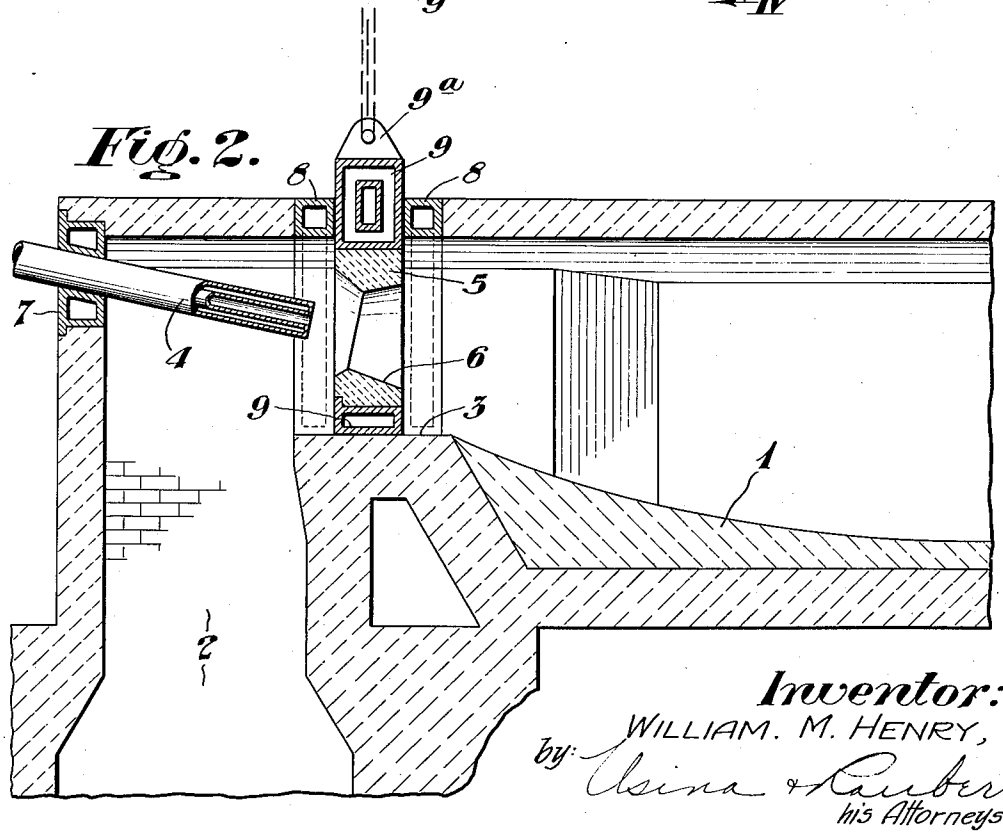


Fig. 2.



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Fig. 3.

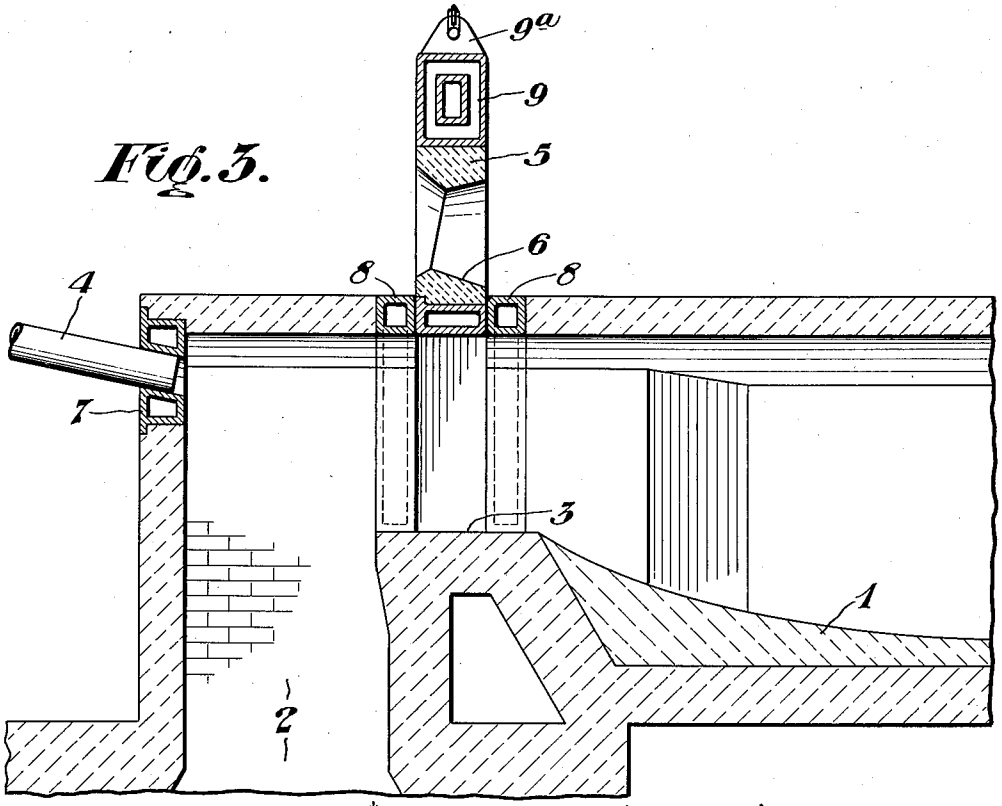
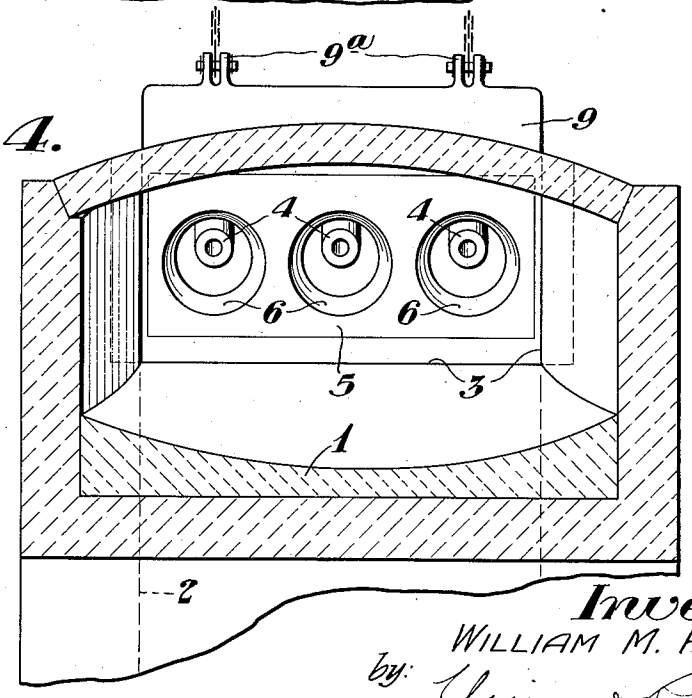


Fig. 4.



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Patented Dec. 24, 1935 2,025,165

UNITED STATES PATENT OFFICE

2,025,165

METALLURGICAL FURNACE

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Application November 21, 1934, Serial No. 754,153

4 Claims. (Cl. 263—15)

This invention relates particularly to reversing open-hearth furnaces, one of the objects being to generally improve the efficiency of such a furnace. Other objects may be inferred.

Referring to the accompanying drawings:

Figure 1 is a horizontal section of an end of a metallurgical furnace embodying the features of the invention.

Figures 2 and 3 are vertical sections from the line II—II in Figure 1, and respectively illustrate the operation of the invention at different stages.

Figure 4 is a cross-section from the line IV—IV in Figure 1.

This furnace is the reversing type and includes an open-hearth 1, an up-and-down-take 2, a passage 3 between this hearth and the up-and-down-take, a plurality of fuel nozzles 4 pointing through the passage 3 toward the hearth 1 and a plate 5 arranged for movement from a position in the passage 3 to one where it is free from this passage and which provides venturis 6 properly associated with the nozzles 4 when the plate is in the first named position.

It should be noted that the passage 3 is of substantially the same cross-sectional area as that of the up-and-down-take 2 and that movement of the plate 5 to its second named position, as shown by Figure 3, leaves this passage completely free. Although not shown, the opposite end of this furnace includes a similar arrangement.

When the plate is in the passage, as shown by Figure 2, flows of fuel may be introduced by the nozzles 4 through the venturis 6, while air is simultaneously introduced through the up-and-down-take 2, preferably under pressure. The Venturi action is such that almost complete combustion may be expected, particularly in view of the fact that a plurality of small burners as provided by this arrangement are more efficient than a single burner. The use of a series of burners is not the usual practice for the reason that it would ordinarily be expected that they would unduly retard the products of combustion when the opposite end of the furnace was on heat. However, in the present instance the plate 5 may be completely removed from the passage 3 when the opposite end of the furnace is on heat, as is shown by Figure 3. This not only does not unduly retard the flow from the furnace, but actually provides a better exit than can possibly be expected from the usual port construction, the passage 3 being fully as large as the up-and-down-take 2.

The nozzles 4 are thrust through water-cooled plates 7 arranged in the end wall of the furnace, and are themselves of a double-walled construction whereby they may also be water-cooled. These nozzles may slide in the plates 7 so that they may be completely removed from over the up-and-down-take 2, in which case they need not be water-cooled. Such an arrangement permits an absolutely free flow from the furnace except for such factors as are usually associated with conduits. The relatively small size of the nozzles 4 should, however, not ordinarily interfere with the flow from the furnace, and it may often be desirable to use the water-cooled ones illustrated and leave them permanently in place.

A vertical water-cooled slideway 8 may be associated with the passage 3, and a water-cooled frame 9 may ride in this slideway and carry the plate 5. The frame 9 may be provided with ears 9a by means of which it may be connected to the reversing mechanism conventionally employed in the operation of an open-hearth furnace.

This specific example of the invention is disclosed in accordance with the patent statutes, and not with the intention of limiting the scope exactly thereto, except as defined by the following claims.

I claim:

1. A metallurgical furnace including the combination of an open-hearth, an up-and-down-take, a passage between said hearth and said up-and-down-take, a plurality of water-cooled fuel nozzles pointing through said passage toward said hearth, a vertical water-cooled slideway associated with said passage, a water-cooled frame riding said slideway and a plate mounted by said frame and providing a venturi for each of said nozzles.

2. A metallurgical furnace including the combination of an open-hearth, an up-and-down-take, a passage between said hearth and said up-and-down-take, a plurality of removable fuel nozzles pointing through said passage toward said hearth, a vertical water-cooled slideway associated with said passage, a water-cooled frame riding said slideway and a plate mounted by said frame and providing a venturi for each of said nozzles.

3. A metallurgical furnace including the combination of an open-hearth, an up-and-down-take, a passage between said hearth and said up-and-down-take and which is of substantially the same cross-sectional area as the latter, a plurality of water-cooled fuel nozzles pointing through said passage toward said hearth, a vertical water-cooled slideway associated with said passage, a

water-cooled frame riding said slideway and a plate mounted by said frame and providing a venturi for each of said nozzles.

4. A metallurgical furnace including the combination of an open-hearth, an up-and-down-take, a passage between said hearth and said up-and-down-take and which is of substantially the same cross-sectional area as the latter, a plurality of removable fuel nozzles pointing through said passage toward said hearth, a vertical water-cooled slideway associated with said passage, a water-cooled frame riding said slideway and a plate mounted by said frame and providing a venturi for each of said nozzles.

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