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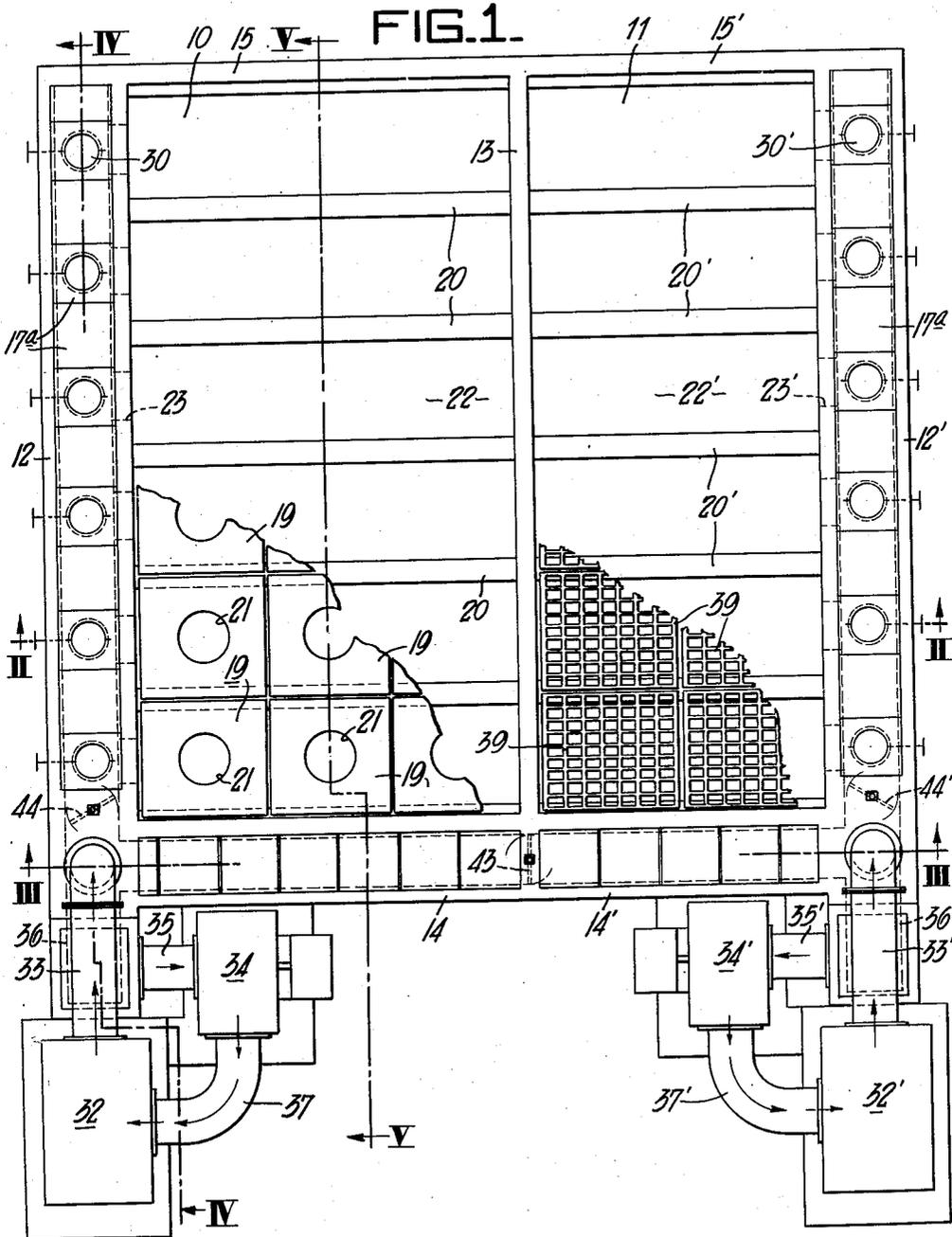
E. W. VON HOFEN ET AL

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FOUNDRY DRYING OVEN

Filed June 11, 1951

3 Sheets-Sheet 1



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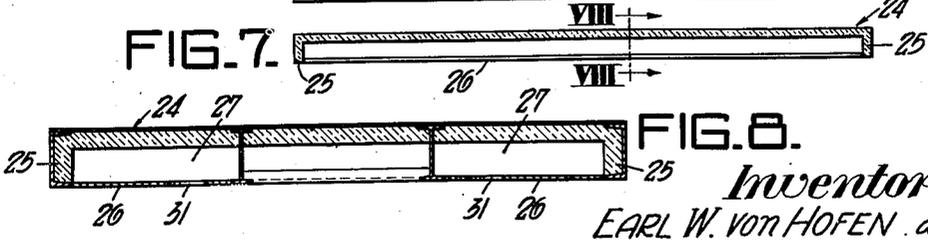
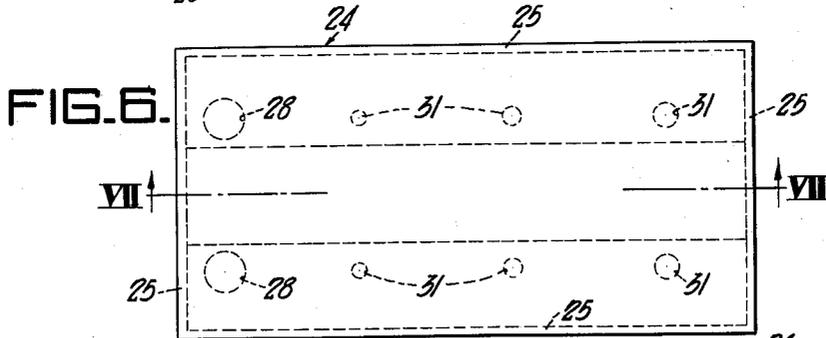
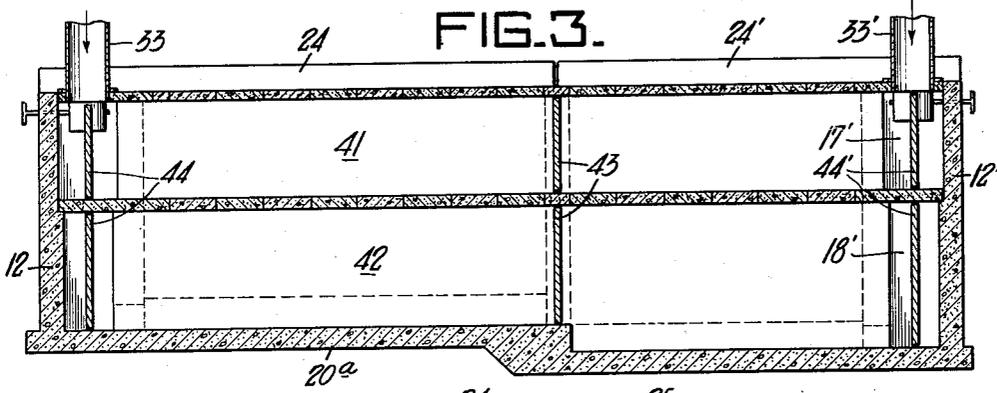
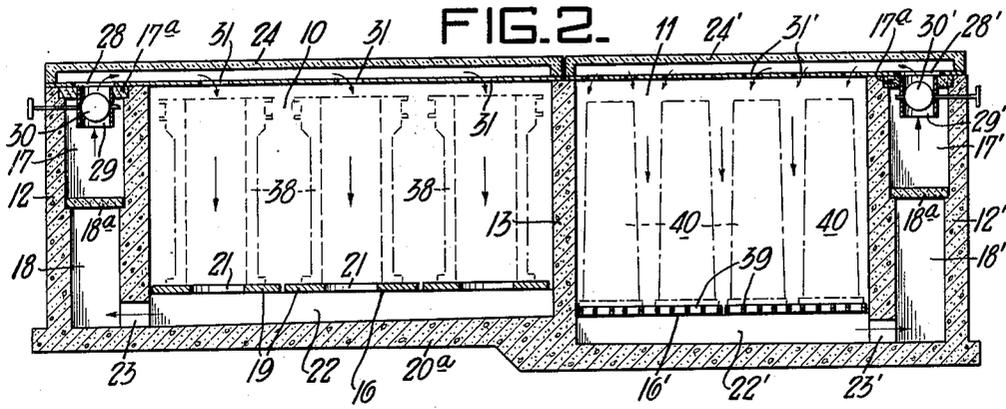
E. W. VON HOFEN ET AL

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FOUNDRY DRYING OVEN

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3 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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FOUNDRY DRYING OVEN

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9 Claims. (Cl. 34—104)

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This invention relates to a drying oven for foundries and, in particular, to an oven adapted for drying the molds and cores used in pouring massive castings such as the large ingot molds used by the steel industry in considerable numbers.

In pouring ingot molds, a metal flask having the mold pattern therein is rammed with moist sand, the pattern is withdrawn and the resulting layer of sand in the flask is dried. Similarly, a core corresponding in size and shape to the desired ingot, is made by ramming sand in a core box having an arbor therein, stripping the box and drying the layer of sand thus produced on the exterior of the arbor. Heretofore, the flasks and cores have been dried by firing heating flames thereon with ring and line burners. The flames had contact almost exclusively with the exterior of the flasks and cores and this made the drying of the flasks very slow, since it was necessary for the heat to penetrate the flask wall before driving moisture out of the sand layer.

We have invented a novel drying oven specially suited for the flasks and cores used in pouring ingot molds, which overcomes the aforementioned objection and permits quicker and more efficient drying of the flasks particularly, but is also of advantage in effecting proper circulation of heated air about the cores. In a preferred embodiment, we provide an oven open at the top, having a floor, side and end walls, and a removable cover. Supply and exhaust flues for heated air are formed in one side wall. The cover has spaced upper and lower walls defining plenum chambers each communicating at one end with the supply flue and at points spaced therealong, with the interior of the oven. Exhaust passages beneath the floor communicate with the interior of the oven and the exhaust flue. Preferably we arrange a flask-drying oven and a core-drying oven side-by-side. The two ovens are generally similar, except for the type of floor, that of the flask-drying oven having large openings spaced thereover, in registry with which the flasks are spotted, and that of the core-drying oven being a grating. Each oven has its own source of heated air and a blower for repeatedly recirculating air from the oven to the heater and back to the oven. Cross-connection flues between heaters, with control dampers, are provided for increased flexibility of operations.

A complete understanding of the invention may be obtained from the following detailed description and explanation which refer to the accompanying drawings illustrating the present preferred embodiment. In the drawings,

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Figure 1 is a plan view of a flask-drying oven and a core-drying oven with the covers removed and the floors partly broken away;

Figures 2 and 3 are cross-sections taken along the planes of lines II—II and III—III, respectively, of Figure 1 showing the covers in place;

Figures 4 and 5 are longitudinal sections taken along the planes of lines IV—IV and V—V, respectively, of Figure 1 showing the covers in place;

Figure 6 is a plan view of one of the covers;

Figure 7 is a longitudinal section therethrough taken along the plane of line VII—VII of Figure 6; and

Figure 8 is a cross-section through the cover portion taken along the plane of line VIII—VIII of Figure 7.

Referring now in detail to the drawings, we preferably arrange a flask-drying oven 10 and a core-drying oven 11 side-by-side. The ovens are identical in construction except for the character of the floor (as will be specifically pointed out later) though they differ slightly in certain dimensions, so a description of the flask-drying oven will suffice for both, corresponding parts of the core-drying oven being designated by the same reference numerals primed. Oven 10 is defined by side walls 12 and 13, end walls 14 and 15 and a floor 16. Wall 13 is common to both ovens and walls 14' and 15' are continuations of walls 14 and 15. Wall 12 has upper and lower flues 17 and 18 therein defined by top slabs 17^a and intermediate slabs 18^a (see Figures 2 and 4). Floor 16 is composed of pallets or slabs 19 laid on spaced piers 20 extending across the oven foundation 20^a. Each pallet 19 has a central opening 21 therein. The piers 20 define exhaust passages 22 below the floor and ports 23 in the inner side of wall 12 provide communication between the passages and flue 18.

The oven has removable covers 24 thereon spanning the distance between walls 12 and 13. For convenience in handling, the covers preferably have a width only about double that of passages 22, thus requiring three covers for the full length of the oven. As shown in Figures 6 through 8, each cover 24 is fabricated from structural members and plate and has a peripheral depending flange or vertical wall 25. Bottom plates 26 secured to the covers, together with the flange and intermediate structural members, define spaced plenum chambers 27. The interior of covers 24, except for the bottom plate 26, is lined with thermal insulation. Plates 26 have openings 28 adjacent the outer ends of the cover adapted to register with ports 29 extending

through the top of spaced slabs 17^a overlying flue 17. Each port has a control damper 30 therein. Plates 26 also have holes 31 spaced therealong aligned with openings 21 in pallets 19.

An air heater 32 of any suitable type is mounted adjacent one end of wall 12 and has its outlet connected by a pipe 33 to flue 17. A blower 34 adjacent the heater has its inlet connected by a pipe 35 to an uptake 36 (see Figure 4) communicating with flue 18. The blower delivers air through a pipe 37 to the inlet of the heater. Flues 17 and 18 thus serve as supply and return mains, respectively. By this arrangement, it will be apparent that air from the heater flows through pipe 33, flue 17, and ports 29 into chambers 27 in covers 25. Air is discharged from these chambers through ports 31 into the oven and downwardly through the interior of flasks 38 standing on floor 16 in registry with openings 21. The heated air thus has direct contact with the sand layer lining the flasks and quickly absorbs moisture therefrom. After passing through the flasks, the air flows through openings 21, passages 22 and ports 23 to flue 18 whence it returns to the blower by uptake 36 and pipe 35 and finally to the heater by pipe 37. In order to eliminate moisture from the circulating air, a portion thereof may be continuously vented to the atmosphere and replaced by fresh air. Dampers 30 permit the distribution of heated air to be controlled longitudinally of the oven and ports 31 are graduated in size to effect substantially uniform distribution transversely of the oven.

Core-drying oven 11 operates in the same manner as the flask-drying oven. Its construction is similar except that its floor is composed of grating panels 39. Cores 40 may thus be stood anywhere on the floor with the assurance that they will be subjected to the drying effect of heated air flowing downwardly from ports 31', around the exterior of the cores and through the voids in the grating into passages 22'.

It may be desirable at times to divide the air from either heater between the two ovens or to deliver air from both heaters to one oven. To permit this, we provide cross-connecting supply and return flues 41 and 42 (see Figure 3) in walls 14 and 14'. Flue 41 connects flues 17 and 17' while flue 42 connects flues 18 and 18'. A damper 43 normally closes both flues 41 and 42 but it may be opened to permit flow of heated air therethrough from the heater of either oven to the other. Dampers 44 and 44' in flues 17, 18 and 17', 18' are normally open but permit the output of air from one or both heaters to be divided as desired between the two ovens.

It will be apparent from the foregoing that our invention has many advantages. In the first place, drying of the flasks is effected more efficiently than heretofore since the heated air has direct contact with the sand lining and little or no heat is wasted in the metal wall of the flasks. Secondly, the time required for adequate drying is reduced since the sand lining the flasks dries from its inner surface outwardly instead of the reverse. In addition, the oven may be easily loaded and emptied by a crane which also serves for removing and replacing the covers. Exact spotting of the cores is not necessary and there is considerable leeway in respect to positioning the flasks so as to insure that air will flow through the interior thereof. The construction of the ovens is simple and long-lasting, requiring but little maintenance. Recirculation of heated air repeatedly between the oven and heater reduces

the fuel consumption as compared with heating a continuous supply of fresh air or applying heating flames directly to the flasks and cores.

Although we have disclosed herein the preferred embodiment of our invention, we intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

We claim:

1. A drying oven comprising side and end walls, a floor and a removable cover spanning said side walls, said cover including a layer of thermal insulation and a bottom spaced therebelow, vertically spaced warm-air supply and return flues extending along one of said side walls, ports spaced along the top of the upper flue, openings in said bottom registering with said ports, said bottom and floor having inlet and outlet ports distributed thereover, respectively, and transverse exhaust passages below said floor communicating with the lower flue.

2. A drying oven as defined by claim 1 characterized by dampers in said first-mentioned ports.

3. A drying oven comprising side and end walls, a floor and a removable cover spanning said side walls, said cover having a top and bottom spaced apart defining a plenum chamber, said bottom having ports therein communicating with the interior of the oven, said floor having exhaust ports therein, and means supplying hot gases to the plenum chamber and withdrawing them through said exhaust ports, said means including upper and lower supply and exhaust flues in one of said side walls, said supply flue communicating with said chamber along one side thereof, and transverse passages below said floor connecting the exhaust ports to said exhaust flue.

4. A drying oven as defined by claim 3 characterized by dampers controlling the flow of gases from said supply flue to said chamber.

5. A drying oven as defined by claim 3 characterized by said floor being solid for the most part and said exhaust ports being spaced apart and adapted to register individually with bottomless hollow molds standing on the floor.

6. A drying oven as defined by claim 3 characterized by said floor being a grating adapted for circulating gases around the exterior of cores spotted thereon in spaced relation.

7. A drying oven comprising a floor, side and end walls and a removable cover spanning said side walls, air-supply passages in said cover and return passages below said floor extending across the oven and communicating therewith, supply and return mains at one side of the oven communicating, respectively, with said supply and return passages, and air-heating and circulating means connected to said mains, said mains being flues in one of said side walls.

8. A drying oven comprising a floor, side and end walls and a removable cover spanning said side walls, air-supply passages in said cover and return passages below said floor extending across the oven and communicating therewith, supply and return mains at one side of the oven communicating, respectively, with said supply and return passages, and air-heating and circulating means connected to said mains, said supply main having ports spaced therealong discharging into the passages in the cover, respectively.

9. A drying oven comprising a floor, side and end walls and a removable cover spanning said side walls, air-supply passages in said cover and return passages below said floor extending across

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the oven and communicating therewith, supply and return mains at one side of the oven communicating, respectively, with said supply and return passages, and air-heating and circulating means connected to said mains, said return mains having ports spaced therealong communicating with said return passages, respectively.

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