Aug. 30, 1938. J. ETTL 2,128,698

DRYING APPARATUS

Original Filed May 22, 1936 2 Sheets-Sheet 1

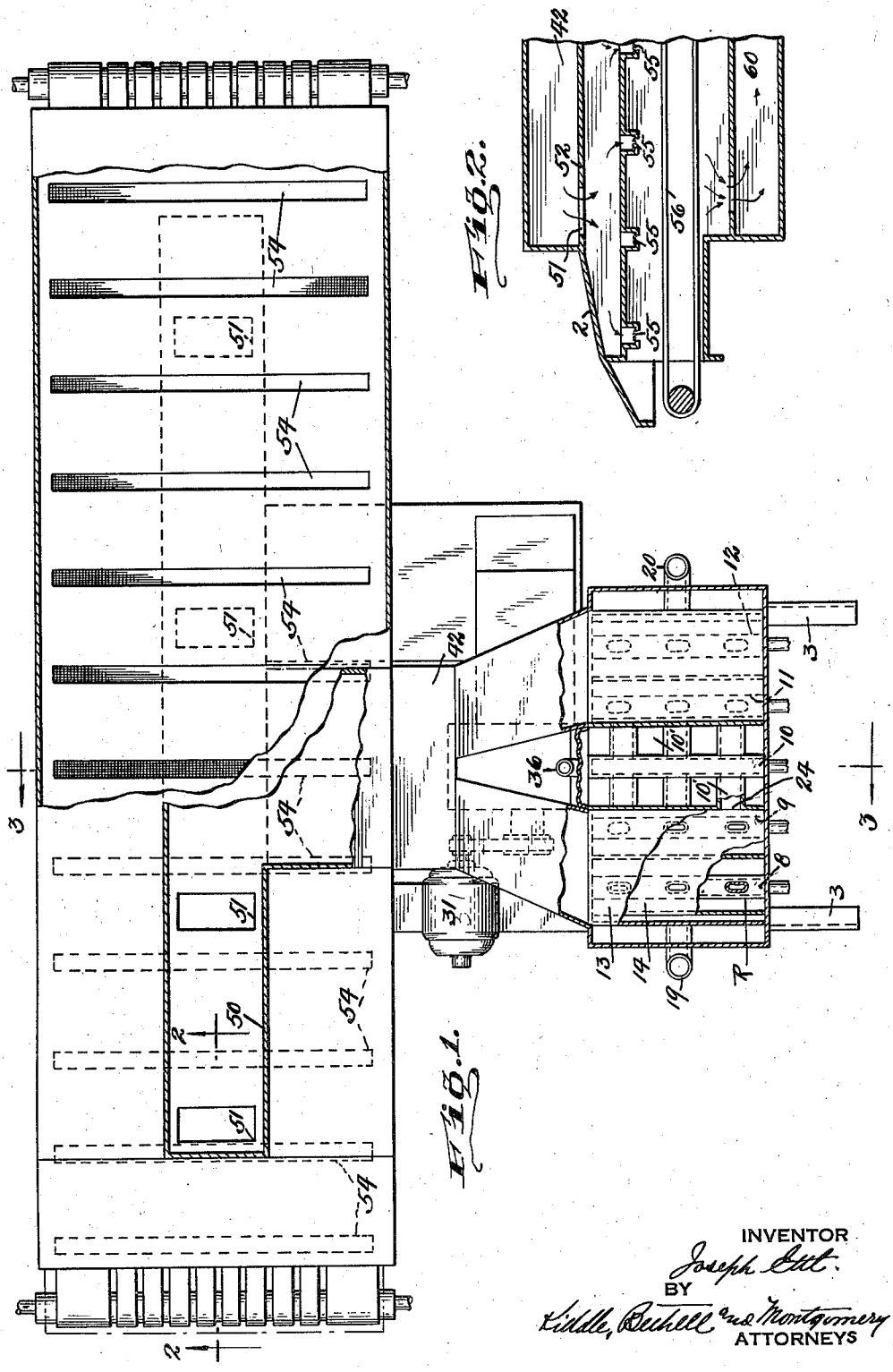


Fig. 1.

Fig. 2.

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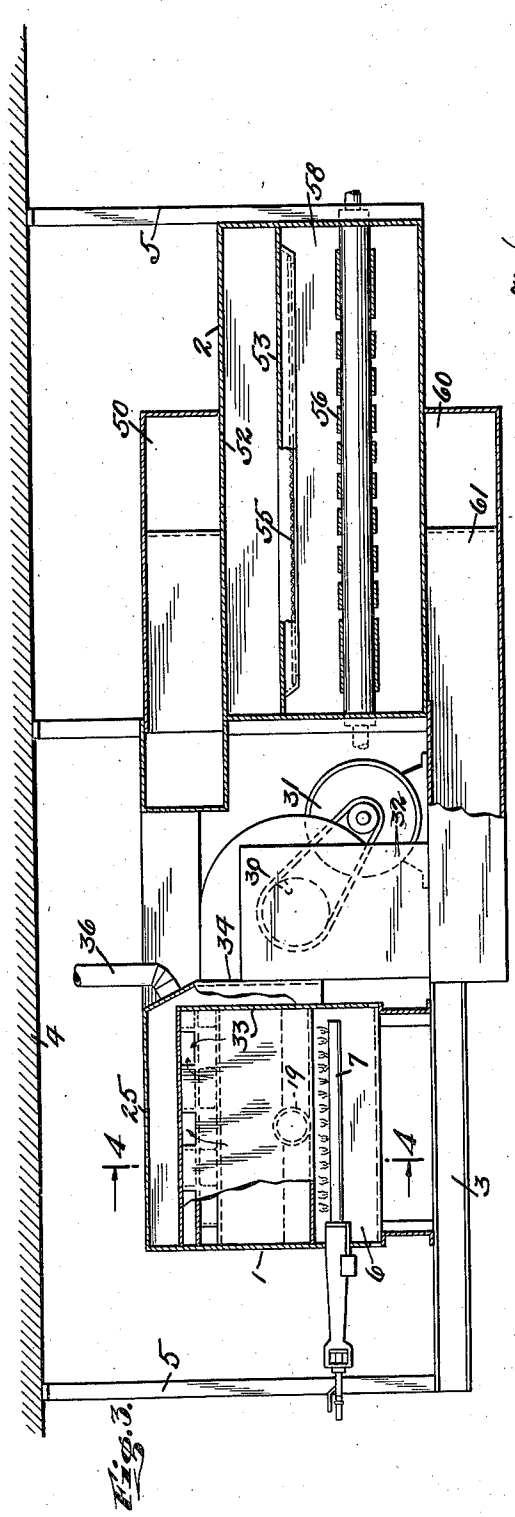


Fig. 3.

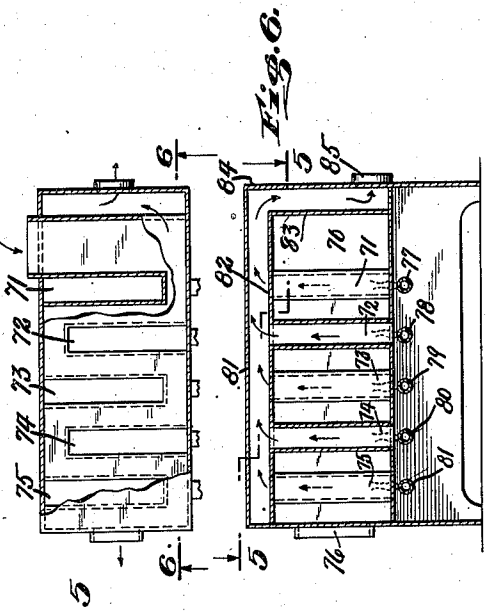


Fig. 5

Fig. 6.

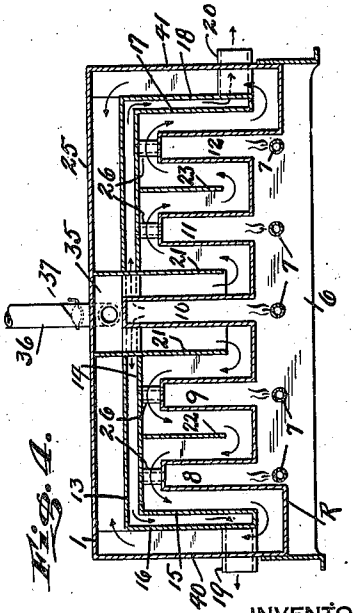


Fig. 4.

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UNITED STATES PATENT OFFICE

2,128,698

DRYING APPARATUS

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Original application May 22, 1936, Serial No. 81,251. Divided and this application February 20, 1937, Serial No. 126,755

3 Claims. (Cl. 126—99)

This invention relates to drying apparatus, the present application being particularly directed to a heater for heating the air which is to be circulated through the drying chamber or oven for the purpose of drying or heating articles or materials passed through the oven on conveyors.

The invention provides an apparatus involving a novel arrangement of parts whereby complete and uniform drying or heating of articles or materials may readily be accomplished.

The present application is a division of my copending application Serial No. 81,251, filed May 22, 1936, the claims herein being particularly directed to the heater or heating chamber.

In the accompanying drawings:

Fig. 1 is a plan view of my improved apparatus partly broken away to expose the interior construction;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 1;

Fig. 4 is a section through the heater on the line 4—4 of Fig. 3;

Figs. 5 and 6 are, respectively, plan and sectional views of a modified form of heater or heat generating chamber.

Referring to the drawings in detail: 1 designates a heat chamber wherein air is heated, the heated air then being passed to a drying chamber or oven 2 which is in communication with the heat chamber. The heat chamber and oven may be supported on suitable girders or platform 3 suspended from the ceiling 4 by means of struts 5, or the equipment may be mounted in any other suitable fashion.

The heat chamber or heater 1 is provided with a combustion compartment, designated 6, and provided with a plurality of burners 7.

The roof or top wall of this combustion compartment is designated R and as will be seen from Fig. 4, for instance, is shaped to provide a plurality of flues 8, 9, 10, 11 and 12, a flue being provided directly above each burner.

Within the heat chamber 1 is a pair of horizontally extending spaced walls 13 and 14, the space between these walls communicating at one side of the chamber with the space between a pair of vertically extending walls 15 and 16, and at the other side with the space between another pair of vertical walls 17 and 18. Exhaust pipes or ducts 19 and 20, respectively, lead from the space between the walls 15 and 16 and the space between the walls 17 and 18.

The central flue 10, of the group of flues above mentioned, extends above the horizontally extending wall 14 and is provided with laterally extending flues or conduits 10' extending into the space between the walls 13 and 14.

The upper ends of the flues 8, 9, 11 and 12 have short pipes 26 projecting upwardly into the space between the walls 13 and 14. It is through the pipes or conduits 10' and 26 that the products of combustion pass from the combustion chamber 6 into the compartment formed by the spaced walls 13 and 14, the products of combustion in this compartment passing downwardly between the vertically spaced walls 15, 16 on one side and 17, 18 on the other side and out through the exhaust pipes 19 and 20.

It will be appreciated, of course, that it would not be desirable to utilize the products of combustion in the drying chamber or oven 2 due to the gases and impurities it contains; consequently, the exhaust ducts 19 and 20 lead to waste or, if desired, the products of combustion passing therethrough may be re-circulated in the heat chamber 6.

The air which is employed and utilized in the drying chamber or oven is fresh, clean air which is heated by circulating the same in contact with the outside walls of the flues 8, 9, 10, 11 and 12 and the walls 13, 16 and 17 of the heater compartment.

Extending downwardly from the wall 14 between the flues 8, 9 and the flues 11, 12 I provide baffles 22 and 23. I also provide baffles 21 extending downwardly from the top wall 25 of the chamber 1 between the flues 9 and 10 and between the flues 10 and 11. These baffles are provided with openings 24 adjacent their upper ends to accommodate the lateral extension 10' of the flue 10, as will be seen from Fig. 1, for instance.

The drying air is re-circulated from the drying chamber or oven 2 by means of a blower 30 driven by a motor 31, this blower being located in blower housing 32 communicating with the heating chamber 1 through a conduit formed by vertical walls 33 and 34, which conduit communicates with the intake conduit 35 of Fig. 4.

Auxiliary air inlet 36 is located in the intake conduit 35 for the admission of fresh auxiliary air to the heating chamber. This auxiliary air inlet is controlled by a manually operated damper 37.

The air entering the intake conduit travels downwardly between the baffles 21 where it is divided by the flue 10 so that part of the air will flow to the right and part to the left of the

chamber, as viewed in Fig. 4. This air will pass in a staggered path between the downwardly extending baffles 22 and 23 and the upwardly extending flues 8, 9, 11 and 12 in the direction of the arrows shown in Fig. 4, the air on one side passing upwardly between the walls 16 and 40 and on the other side between the walls 18 and 41 to outlet conduit 42 which in turn communicates with the drying chamber or oven 22.

While the claims of this application are limited to the heater above described, I will briefly, for the purposes of clarity, describe the construction of the drying oven and the circulation of air from the heater through the oven, etc.

The drying chamber 2 receives the heated air from the heating chamber 1 through the outlet conduit 42, above referred to. This conduit communicates with a longitudinally extending conduit 50 provided with a plurality of spaced openings 51 in the bottom wall or partition 52 thereof. Below the partition 52 is another wall or partition 53 and the space between the partitions 52 and 53 I shall call an equalizing chamber, the air being evenly distributed therein. The partition 53 is provided with a plurality of transversely extending spaced slots 54.

The air passing from the outlet conduit 42 enters the space between the walls or partitions 52 and 53 through the spaced openings 51 which serve to distribute the air evenly, the air passing from this space to the drying compartment or oven 58 through the slots 54, each of which supports screens 55 which further evenly distribute the air before the same is directed upon articles on the conveyor 56.

The heated air after it passes the conveyor is drawn through conduits 60 and 61 back to the blower housing 32 where it is again circulated through the heater.

The modified form of heater illustrated in Figs. 5 and 6 likewise provides a long irregular path for the air being heated. In this form the air enters the chamber through inlet conduit 70 and passes around flues 71, 72, 73, 74 and 75 and thence to the drying chamber through outlet conduit 76.

77, 78, 79, 80 and 81 designate burners for the flues 71, 72, 73, 74 and 75, respectively.

The products of combustion from the flues pass through the conduit 80 formed by the horizontally extending spaced walls 81, 82 to the conduit formed by the vertically extending spaced walls 83, 84 and out through exhaust outlet 85.

What I claim is:—

1. In apparatus of the class described, a heater comprising a combustion compartment, a plurality of vertically extending flues extending upwardly from the combustion compartment toward the top of said heater, vertically extending baffles between said flues, the spaces between said flues and baffles providing a staggered path for the passage of air through the heater out of contact with the products of combustion from the combustion compartment, spaced walls above said flues, conduits connecting said flues with the space between said walls, said space communicating with the exterior of the heater for the exhaust of products of combustion from said flues, the air after traversing said staggered path passing about said spaced walls to the exterior of said heater.

2. In apparatus of the class described, a heater comprising a combustion compartment, vertically extending side and central flues, spaced walls above said flues, said vertically extending side flues each having a vertically extending conduit communicating with the space between said walls, said central flue having transverse passages communicating with the space between said walls, and exhaust ducts from the space between said walls to the exterior of the heater.

3. In apparatus of the class described, a heater comprising a combustion compartment, vertically extending side and central flues, spaced walls above said flues, said vertically extending side flues each having a vertical conduit communicating with the space between said walls, said vertical central flue having transverse passage communicating with the said space, exhaust ducts leading from the space between said walls to the exterior of the heater, the products of combustion from the combustion compartment passing through said flues and between said spaced walls to said exhaust ducts, and baffles extending from one of said walls downwardly between adjacent flues to effect the passage in a staggered path of air passing through the heater along the outside of said flues and spaced walls.

JOSEPH ETTL.