Aug. 27, 1935. H. ROTTERSMANN 2,012,549

BAKING OVEN

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Fig. 1.

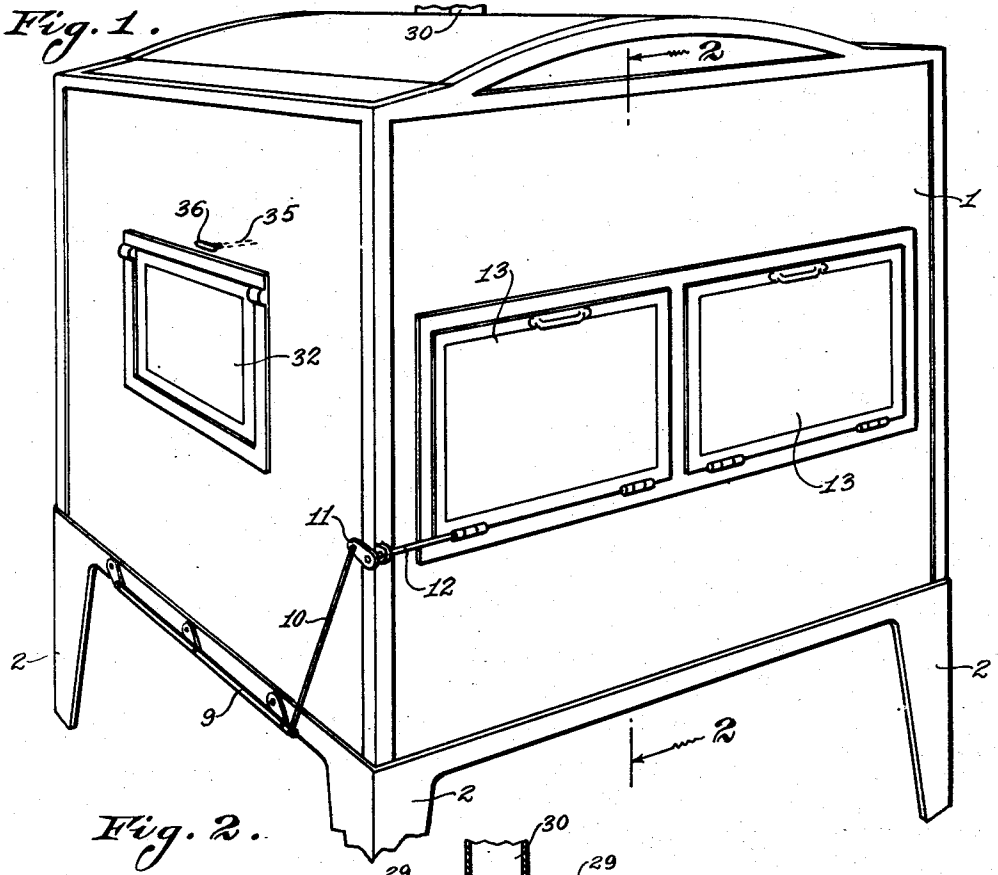
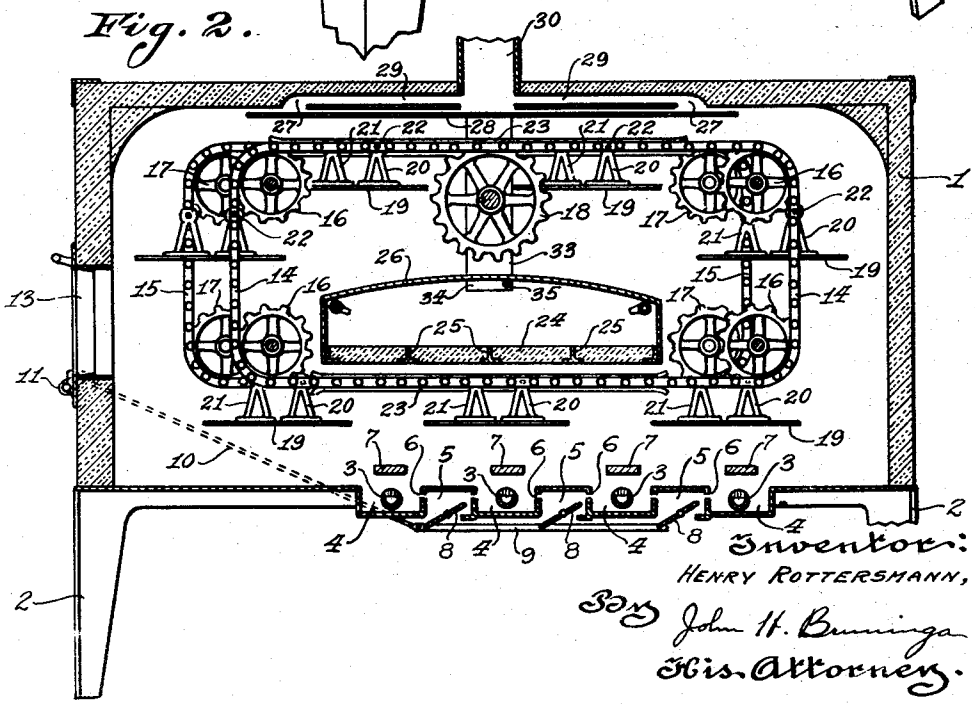


Fig. 2.



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Fig. 3.

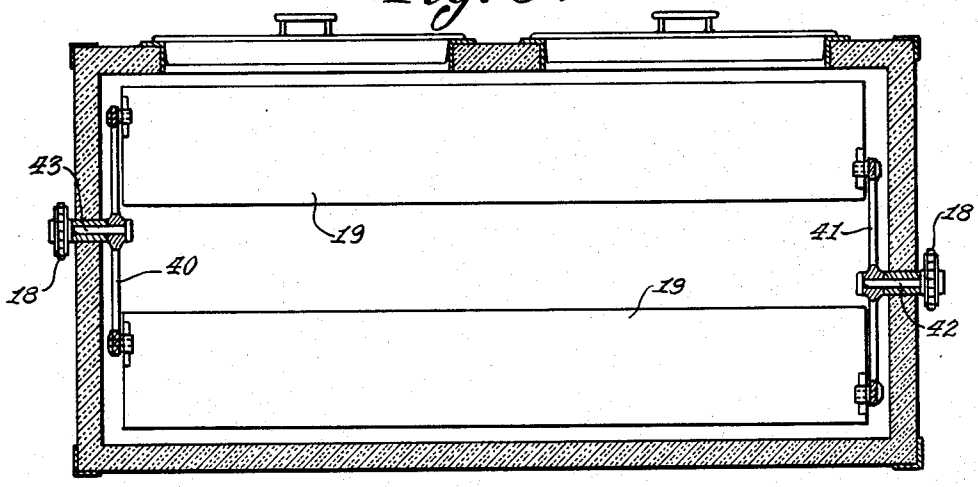


Fig. 6.

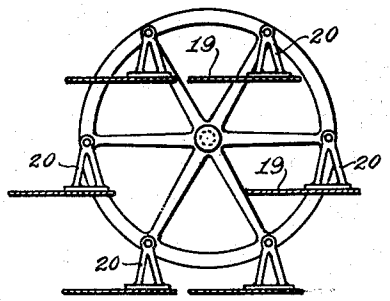


Fig. 4.

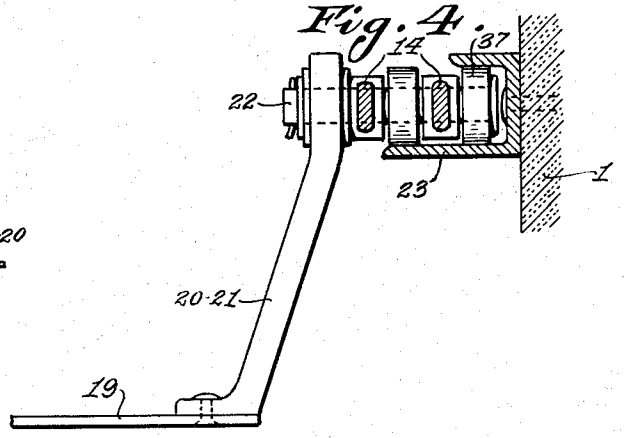
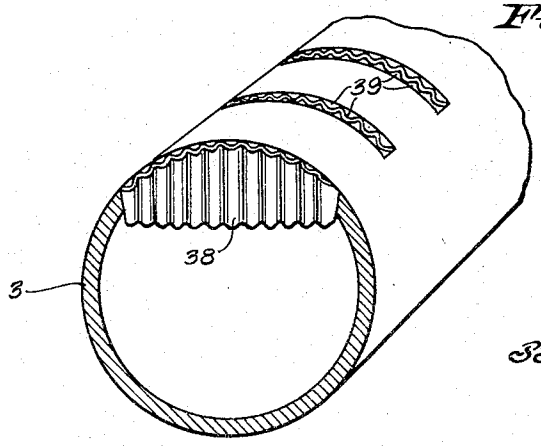


Fig. 5.



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BAKING OVEN

Henry Rottersmann, Webster Groves, Mo.

Application December 13, 1933, Serial No. 702,115

13 Claims. (Cl. 107—57)

This invention pertains to baking ovens.

One of the objects of this invention is to provide an improved oven of the type combining the traveling and the stationary hearth types of oven, such as to improve the efficiency particularly in the heating of the hearth.

Another object is to provide such an oven having an improved type of traveling carrier.

Another object is to provide a carrier having means whereby the trays are maintained level and prevented from swinging.

Another object is to provide an improved burner construction for such an oven.

Further objects will appear from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of an oven embodying this invention;

Figure 2 is a section on line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view of an oven illustrating another embodiment of this invention in which the circuit traversed by the product being baked is circular;

Figure 4 is a detail view illustrating the suspension of the trays from the carrier chain in the embodiment of Figure 2;

Figure 5 is an enlarged perspective detail illustrating the construction of the burner tubes and,

Figure 6 is a sectional view of Figure 3 illustrating the supporting wheel or spider and the suspension of the trays thereon.

Referring to the drawings, 1 designates an enclosure forming the bottom, walls and roof of the oven. This may be constructed in the usual manner of a structural iron frame with double steel walls packed therebetween with a suitable insulating material, such as thermite. The frame is mounted on legs 2 of a substantial height such as to raise the oven a substantial distance from the floor. This height should be sufficient so that a view of the floor underneath may be had without inconvenience, and so that easy access is provided for keeping this space in a clean and sanitary condition. Mounted within the bottom part of the oven in any suitable manner is a burner for heating the same comprising a series of burner tubes 3. These tubes are preferably provided with a series of closely adjacent transverse slots to form flame openings. These slots may have inserted in each one thereof, a corrugated strip 38 of metal so as to divide the slot into a series of isolated jet openings 39, as illustrated in Figure 5. The bottom of the oven or enclosure 1 is formed with a series of troughs 4 within which the burner tubes 3 are positioned so as to extend thereabout. Between the troughs 4 air tunnels 5 are formed. The walls of these tunnels are provided with air inlet openings 6 into the troughs 4, and preferably opposite the flame openings in the burner tubes. These inlet openings provide the so-called secondary air to support combustion of the gas issuing from the burners, the primary air being mixed with the gas preliminarily to its introduction into the tubes 3 in the usual manner. Baffles 7 are positioned over the burner tubes so as to protect them from foreign matter falling from above.

The bottoms of the air tunnels 5 are provided with valves or dampers 8 pivoted so as to open or close the bottoms of these tunnels in order to admit or cut off air from the inlet openings 6. The entire series of valves 8 may be connected together by a rod 9 and these may further be connected by a link 10 to an arm 11 fixed to a shaft or bar 12. The latter bar is fixed to the hinge of a door 13 in the end of the enclosure 1. This arrangement is such that when the door 13 is open the valves 8 are closed so as to cut off air from the tunnels 6.

This arrangement is for the purpose of protecting the attendant. If the supply of secondary air provided by the inlet 6 were uninterrupted, there would be a rush of heated air out of the door 13 as soon as it was opened. This, of course, imposes great discomfort on the attendant operating through said door. In accordance with the arrangement described above the valves 8 close automatically so as to cut off the supply of secondary air when the door 13 is opened. Accordingly, upon the opening of that door the flue suction will tend to draw air into the door-opening to supply the combustion of the gas.

Mounted within the enclosure 1 is a traveling carrier having trays upon which the product to be baked may be carried in a circuit through the oven during the baking process. This carrier may comprise a pair of chains 14 and 15. The chain 14 is mounted on sprockets 16 on the front side of the oven, as seen in Figure 2, while the chain 15 runs on sprockets 17 on the rear side of the oven. These chains form carrier elements upon which trays are mounted as will presently be described. The sprockets 16 are offset relatively to the sprockets 17. This offset is in a horizontal direction as shown in Figure 2. These two chains are driven in unison by driving means 18 of any suitable character. Trays 19 are mounted on the chains 14 and 15 so as to be car-

ried through the circuit traversed by said chains. Each tray is provided with suspension brackets 20 and 21. The bracket 20 is on the forward end of the tray, as seen in Figure 2, while the bracket 21 is on the rearward end. The bracket 20 has a swivel connection with the chain 14, while the bracket 21 has a similar connection with the chain 15. These brackets are offset on the tray 19 for a distance and in a direction corresponding to the offset between the sprockets 16 and 17. The sprockets 16 and 17 are mounted on stub shafts suitably supported in the enclosure 1 in such a way that the trays may pass between the sprockets.

It will be seen that this suspension provides that the trays are supported at points offset in the direction of their travel. The shafts connecting the brackets 20 and 21 with their respective chains are indicated at 22 in Figure 4. These shafts engage the brackets and the chains in such a manner as to provide a stiff connection tending to maintain the axis of the shaft in a constant direction. This together with the offset of the brackets provides a suspension which prevents the trays 19 from swinging and maintains them level in all positions of their travel. Rails 23 may be provided to guide the chains along the horizontal portion of their travel in the usual manner, said chains having rollers 27 engaging said rails. The doors 13 are placed in such a position at one end of the circuit of the traveling carriers so that the trays may be loaded and unloaded at this point.

Mounted within the enclosure 1 and within the circuit of the carrier chains is a hearth 24. This may be constructed in any suitable manner as, for instance, of tile, supported by suitable beams 25 suitably supported in the side walls of the oven. Over the hearth 24 a housing 26 is provided. This housing is constructed of steel or other suitable heat conducting material. It is preferably made steam-tight so that an atmosphere of steam may be maintained within the enclosure 26. It will be noted that since the hearth 24 and its enclosure are placed within the main oven, the hearth oven is heated by the same burner that heats the outer oven. The products of combustion generated by the burners 3 fill the entire space within the enclosure 1 and the outside of the housing 26. A plurality of flue openings 27 are provided in the top of the enclosure 1 and a baffle 28 is positioned so as to restrict the passage of the gases into the openings 27, these openings communicate by passages 29 with the outlet flue 30. This arrangement of flue openings somewhat restricts the exit of the hot gases so that the enclosure 1 is maintained filled with these gases. These are, therefore, effective to heat the hearth 24 and the housing 26. These being of light construction may be heated very quickly, particularly the housing 26 being of conducting material transmits the heat of the surrounding gases to the interior of the hearth oven and radiates that heat interiorly to affect the product being baked therein. Steam connections 31 of any suitable type are arranged to convey steam to the interior of the housing 26. A door 32 in the side wall of the enclosure 1 provides access to the hearth oven. A flue connection 33 connects the housing with the flue 30 and may be controlled by a hinged damper 34. The damper 34 may be connected by a rod 35 with a handle 36 adjacent the door 32 so that the attendant may open the damper 34 and discharge the steam from the enclosure 1 before opening the door 32.

In the operation of this oven two types of baked products may be handled at the same time. Two attendants may work, one at the doors 13, and the other at the door 32. The burner being in operation the interior of the enclosure is filled with an atmosphere of hot gases which heat the housing 26 and the hearth 24. The carrier is set in motion by means of any suitable driving device, not shown in the drawings. The attendant at the doors 13 loads the trays 19. These then carry the product slowly around the circuit and back to the doors 13. The travel is timed so that baking is complete in one or more circuits. At the same time a second attendant may handle a different type of product on the hearth 24 opening through the door 32. This hearth is charged with the product after which the door 32 and the damper 34 are closed and, if desired, steam may be injected so as to fill the housing with an atmosphere such as is required for certain types of products. The two attendants may work independently as there is no interference between the two ovens. When the baking in the hearth oven is complete, the damper 34 is opened to discharge the steam, after which the door 32 is opened and the product removed.

In the embodiment of Figure 3 an oven is illustrated in which the trays move in a circular orbit and the inner hearth 24 has been omitted. In this case the trays are connected by means of their brackets 20 and 21 to wheels or spiders 40 and 41. These spiders are mounted for rotation on shafts 42 and 43 having driving means 18 of any suitable character. The shafts 42 and 43 are journaled in the side walls of the oven and in offset relation in a manner similar to that described for the sprockets 16 and 17. The brackets 20 and 21 are also offset on the trays 19 as already described. Consequently the offset relation provides relatively displaced supports for the trays, such that the latter are prevented from tipping or swinging. The spacing between the brackets being the same as that between the shafts 42 and 43, the trays will move around in a circular orbit in response to the movement of the spiders.

It will be seen that this invention provides an improved combination oven. Products adapted to both the traveling and the hearth type of oven may be handled in one unit and at the same time. The same burner provides heat for both and the cost of fuel is no more than would ordinarily be required for the traveling oven alone. In the traveling oven the trays are so mounted that they are maintained level at all times. This is a considerable improvement over prior devices when used in baking certain types of product, such as are made of relatively thin batter. With such a product a tray which is capable of swinging on its supports is liable to assume a non-horizontal position in which case the batter may flow to one side so that the product is uneven in thickness. Furthermore a swinging tray is liable to spill such batter and entirely ruin the product.

It will be noted that, as the hangers 20 and 21 are rigidly secured to the tray 19, the structure including these two hangers and the portion of the tray which extends between them defines a solid figure of polyhedral outline which is rigid and which, by resisting deformation, prevents swinging of the tray.

The arrangement of burners 3 is such that the supply of secondary air may be controlled automatically so as to protect the attendant against unnecessary discomfort. As soon as the door 13 is open this air is cut off by the action of the valve 8.

Thereupon instead of an outrush of hot gases in the attendant's face, there will be an inflow of air into the oven to supply secondary air for combustion which has been cut off by the valves 8. The arrangement of the bottom of the oven is such as to provide convenient mounting for the burner tubes and at the same time provide a simple valve construction whereby this secondary air may be controlled.

In operating the hearth oven a substantially steam-tight housing is provided and no combustion gases are admitted to this housing. Certain types of products are baked in a steam atmosphere in order to give them a certain surface gloss. This requires an atmosphere of steam and is usually ruined by the entrance of combustion gases. In this case also the operator may be protected by discharging the steam atmosphere from the housing before opening the oven to unload the same.

While this invention has been described as embodying a unitary structure, it will be understood that certain individual features or sub-combinations thereof may be of utility by themselves without reference to other features. It will be understood that the use of such individual features or sub-combinations are contemplated by this invention and within the scope of the appended claims. It is obvious that various changes may be made, within the scope of the appended claims, in the details of construction without departing from the spirit of this invention; it is to be understood, therefore, that this invention is not limited to the specific details shown and/or described.

Having thus described the invention, what is claimed is:

1. A baking oven, comprising, a heat-retaining enclosure, a traveling carrier within said enclosure having a tray adapted to receive and carry the product to be baked, a stationary hearth within said enclosure, a substantially steam-tight housing for said hearth within said enclosure, a burner in said enclosure adapted to heat the same and said hearth, steam connections to said housing, and a separate flue connection to said housing having a valve therein.

2. A baking oven, comprising, a heat-retaining enclosure, a traveling carrier within said enclosure having a tray adapted to receive and carry the product to be baked, a burner in said enclosure adapted to heat the same, a door for said enclosure through which the product may be inserted and removed, an air inlet adjacent said burner adapted to supply secondary air thereto, a closure for said inlet, and connections between said door and said closure adapted to close the closure when the door is opened.

3. A baking oven, comprising, a heat-retaining enclosure, a traveling carrier within said enclosure having a tray adapted to receive and carry the product to be baked, a burner in said enclosure adapted to heat the same, a door for said enclosure through which the product may be inserted and removed, a plurality of air inlets adapted to supply secondary air to said burner, a series of valves controlling said inlets connected to operate together, a door for said enclosure and operating means connecting said series with said door.

4. A baking oven, comprising, a heat-retaining enclosure, a traveling carrier within said enclosure having a tray adapted to receive and carry the product to be baked, a burner in said enclosure adapted to heat the same, said burner having a series of elongated burner tubes provided with flame openings, the bottom of said enclosure being formed to provide a series of troughs around said tubes with air tunnels therebetween and having air inlet openings from said tunnels into said troughs, and means for automatically closing said tunnels when said door is opened.

5. A baking oven, comprising, a heat-retaining enclosure, a pair of axially spaced carrier elements each movable in a circuit in said enclosure, said elements having their axes offset relatively to each other, a tray adapted to receive the product to be baked mounted between said elements, and rigid depending connections between said trays and said elements adapted to maintain a constant axial direction and offset on said tray to correspond with the offset of said elements.

6. A baking oven, comprising, a heat-retaining enclosure, a pair of axially spaced carrier chains each movable in a circuit in said enclosure, said chains being offset relatively to each other, a tray adapted to receive the product to be baked mounted to span the axial space between said chains, and rigid depending connections between said tray and said chains offset on said tray to correspond with the offset of said chains.

7. A baking oven, comprising, a heat-retaining enclosure, a traveling carrier within said enclosure having a tray adapted to receive and carry the product to be baked, a burner in said enclosure adapted to heat the same, said burner having an elongated burner tube provided with flame openings, a trough in which said tube is positioned to extend therealong, the walls of said trough being provided with air inlet openings opposite said flame openings, a door for said enclosure, and means for closing said air openings when said door is opened.

8. A baking oven, comprising, a heat-retaining enclosure, a hearth within said enclosure, a heat-conducting housing for said hearth constructed and arranged to be heated entirely by gases surrounding the same, a traveling carrier within said enclosure supported to move in a path encircling said hearth and its housing, and heating means adapted to produce hot gases within said enclosure and surrounding said hearth and its housing.

9. A baking oven, comprising, a heat-retaining enclosure, an enclosed hearth therewithin, heating means arranged in the bottom of said enclosure below said hearth, and a traveling carrier mounted within said enclosure to move in a path encircling said hearth and passing during a lower flight closely above said heating means.

10. A baking oven, comprising, a heat-retaining enclosure, an enclosed hearth therewithin, heating means arranged in distributed relation along the bottom of said enclosure below said hearth, and a traveling carrier mounted within said enclosure to move in a polygonal path encircling said hearth and passing during a lower substantially horizontal flight closely above said heating means.

11. In a baking oven of the character described, a traveling carrier having a plurality of movable supporting elements, means guiding the movement of said elements in similar orbits on parallel axes, one of said orbits being offset transversely of their axes with respect to another, a tray, and means for supporting said tray on said elements forming a rigid structure of polyhedral outline adapted by resisting deformation to prevent swinging of said tray.

12. In a baking oven of the character described, a traveling carrier having a plurality of carrier

chains, guide wheels therefor rotatable on parallel axes and defining orbital paths for said chains, said wheels of one of said chains being offset transversely of their axes with respect to those of another, a tray, and means for suspending said tray from said chains forming a rigid structure of polyhedral outline adapted by resisting deformation to prevent swinging of said tray.

13. In a baking oven of the character described, a traveling carrier having a plurality of carrier chains, guide wheels therefor rotatable on parallel axes and defining orbital paths for said chains, said wheels of one of said chains being offset transversely of their axes with respect to those of another, a tray, and suspension hangers at opposite ends of said tray pivoted on said chains and rigidly secured to said tray in offset relation corresponding to the offset of said wheels.

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