April 22 , 1924. 1,491,689

J. M. GANTVOORT

BAKER'S OVEN

Filed Sept. 2, 1920 5 Sheets-Sheet 1

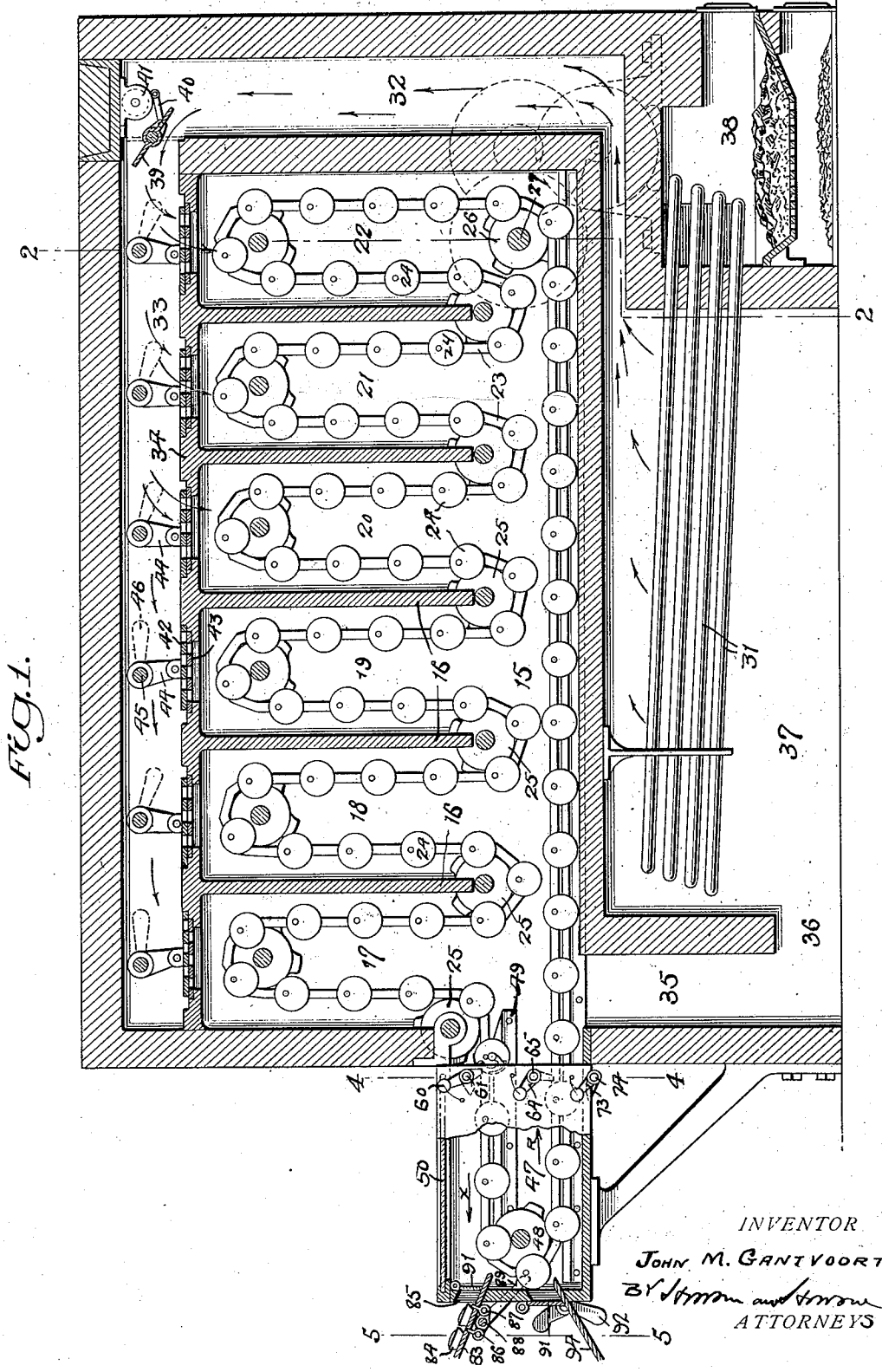


FIG. 1.

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BAKER'S OVEN

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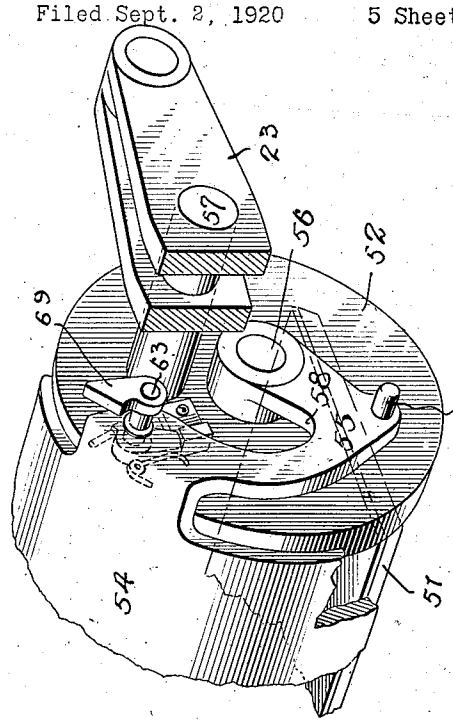


Fig. 3.

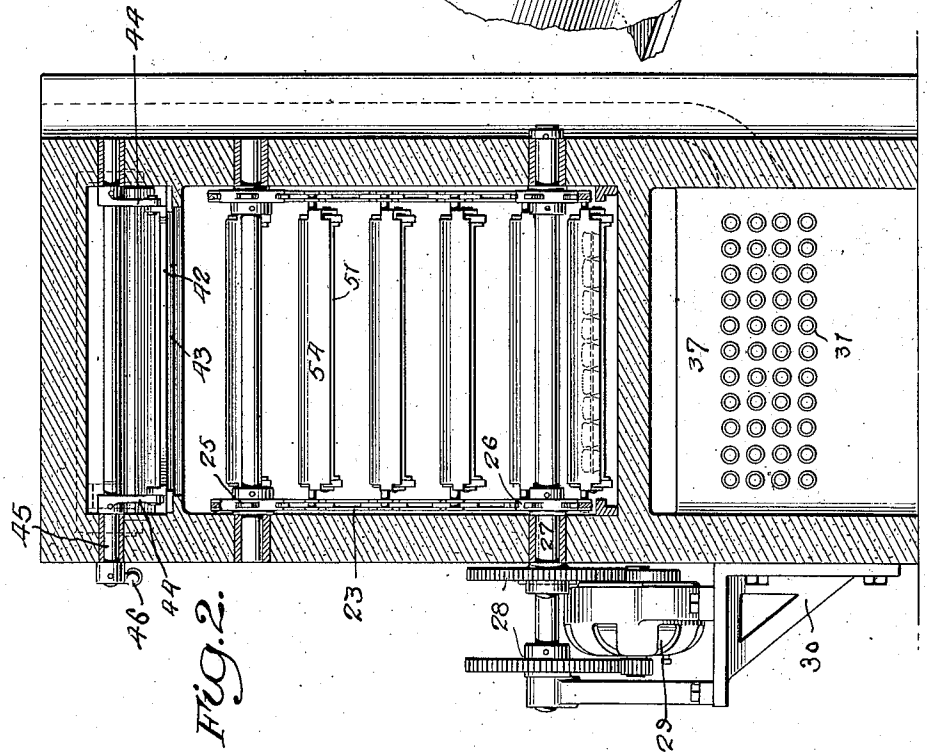


Fig. 2.

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BAKER'S OVEN

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Fig. 4.

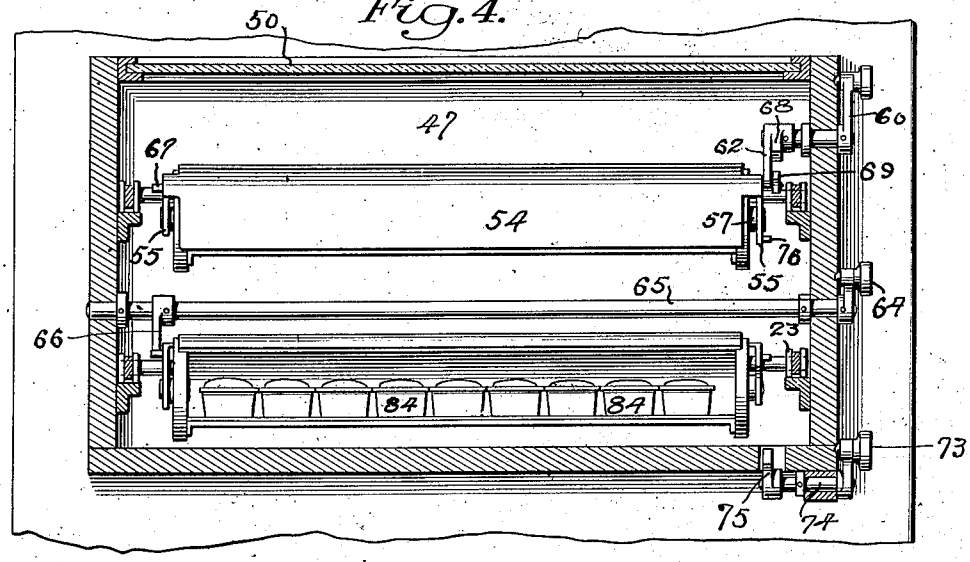


Fig. 5.

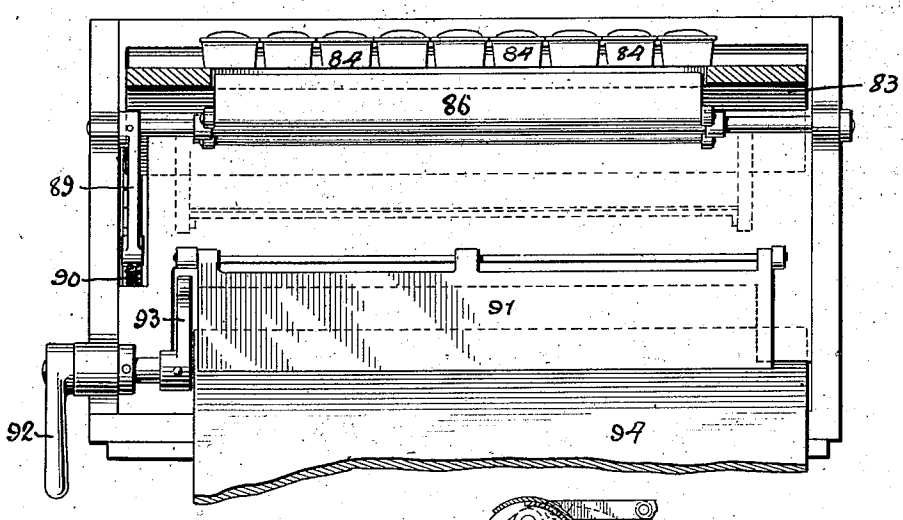
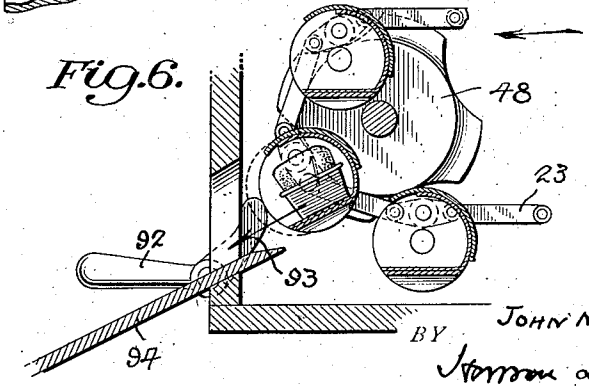


Fig. 6.



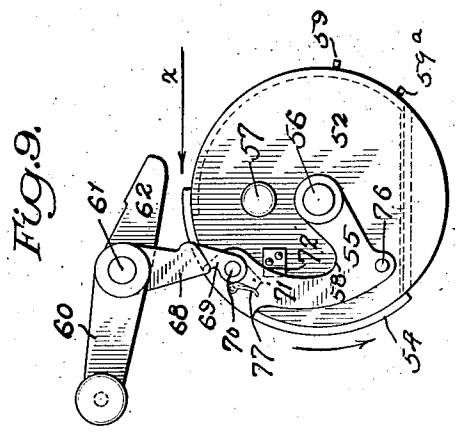
INVENTOR,
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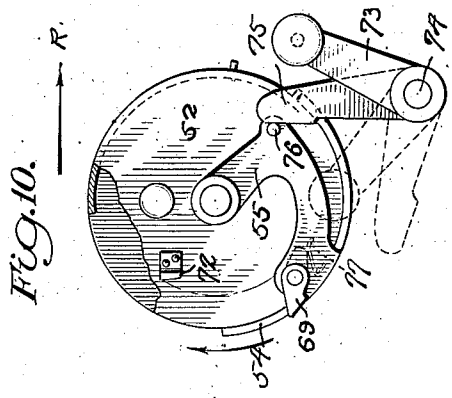
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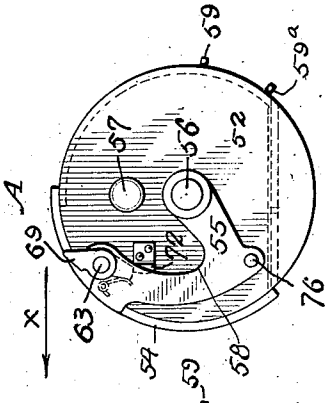
J. M. GANTVOORT

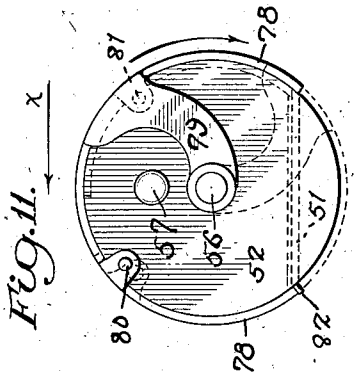
BAKER'S OVEN

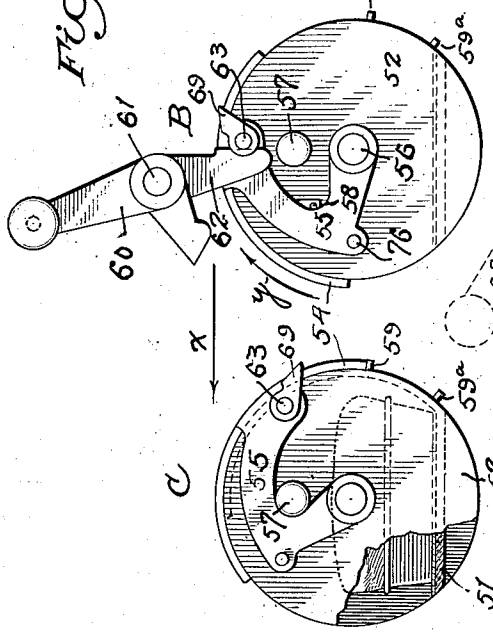
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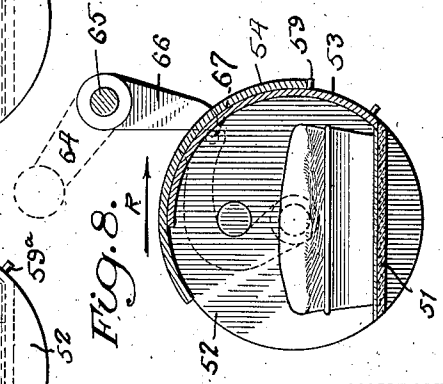












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April 22, 1924. 1,491,689

J. M. GANTVOORT

BAKER'S OVEN

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Fig. 12.

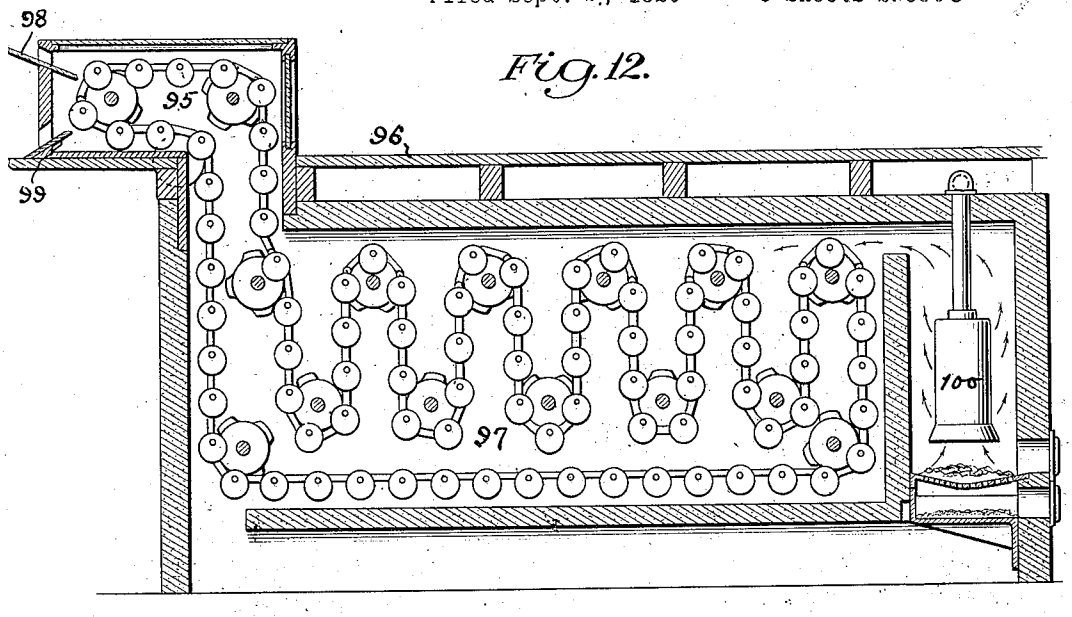


Fig. 13.

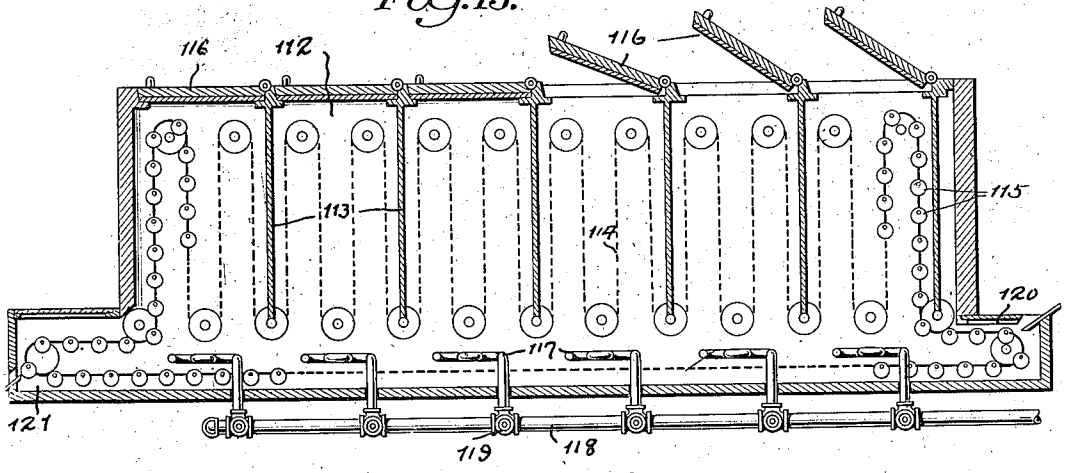
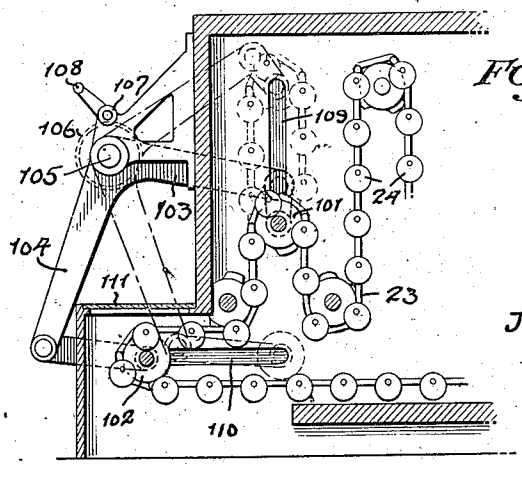


Fig. 14.



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Patented Apr. 22, 1924. 1,491,689

UNITED STATES PATENT OFFICE.

JOHN M. GANTVOORT, OF BEACON, NEW YORK.

BAKER'S OVEN.

Application filed September 2, 1920. Serial No. 407,737.

To all whom it may concern:

Be it known that I, JOHN M. GANTVOORT, a citizen of the United States of America, residing at Beacon, Dutchess County, State of New York, have invented certain new and useful Improvements in Bakers' Ovens, of which the following is a specification.

My invention relates to bakers' ovens, and particularly to traveling ovens. Among the objects of my invention may be mentioned, first, an oven provided with an observation bay, through which the goods travel, and at which point the progress of the baking may be inspected; second, an oven in which loading and discharging may be automatically performed—preferably at the observation bay; third a shelf construction of improved type; fourth, an oven having thermostatic control of the heat supplied thereto; fifth, an oven subdivided into a series of baking compartments through which the goods pass in sequence; sixth, an associated proofing chamber, preferably subdivided and having means for controlling heat in the various compartments thereof through which the goods pass, thus to regulate the progress of the proofing operation.

Referring to the accompanying drawings—

Fig. 1 is a longitudinal section through an oven in which my invention is embodied in one form;

Fig. 2 is a transverse section on the line 2—2, Fig. 1;

Fig. 3 is a perspective of one end of a baking shelf of improved type illustrating one possible form of construction;

Figs. 4 and 5 are sections through the observation chamber on the lines 4—4 and 5—5, Fig. 1, respectively;

Fig. 6 is a partial longitudinal section through the observation chamber showing the operation of the automatic discharge from a baking shelf;

Fig. 7 is a broken side elevation of a group of three successive shelves showing a device for controlling the adjustable shelf hood;

Fig. 8 is a transverse section through a shelf, showing a device for returning the hood to closed position;

Fig. 9 is a side elevation of a shelf showing a device for operating the hood in the opposite direction from that shown in Fig. 7;

Fig. 10 is a broken side elevation of a shelf showing a device for closing the hood from the position to which it moves after its release in the manner indicated in Fig. 9;

Fig. 11 is a side elevation of a modified construction of the shelf;

Fig. 12 is a longitudinal section through an oven of modified construction;

Fig. 13 is a longitudinal section through a proofing chamber; and

Fig. 14 is a partial section through an oven of still further modified form.

It is well recognized by bakers that a chain or traveling oven has many advantages over the usual peel or draw-plate ovens, but as heretofore constructed, chain ovens have been too large for general use, and their mechanism or construction is not adapted to medium or small sized bakeries; they have consequently gone into use only in the largest baking establishments. Moreover, these ovens have been heretofore adapted only for baking a single type of goods, e. g. bread or pastry, and consequently do not meet the requirements of an establishment which desires to turn out baked goods of different types, such as pies, cakes and pastry, as well as bread. My invention provides an efficient oven adapted to small as well as large bakery conditions. A valuable feature of my invention resides in the provision of a baking shelf of novel type, which may be regulated to afford greater bottom than top heat, or vice versa, in accordance with the requirements of the particular goods in hand. Preferably, I associate with the oven, means for automatically operating the adjustable elements of the shelf for this purpose. Furthermore, I associate with the oven, a bay through which the conveyor chain is led from the main oven chamber, and at which the progress of the baking operation may be inspected, while automatic charging and discharging arrangements are preferably provided in this bay. The position of the bay may be varied to suit the requirements of any desired installation, such, for instance, as the location of the baking chamber in a basement or sub-basement, from which the conveyor chain is led to the observation bay on another floor, thus keeping the working mechanism of the oven out of the discharging and loading room. The construction

may be such that the travel of the chain may be temporarily deflected into the observation chamber, which at other times is often shut off from the oven chamber. Other features of improvement will be obvious from reference to the drawings, or from the following description of the construction there shown.

In Fig. 1 the oven chamber 15 is subdivided by the partitions 16 into a series of independent compartments 17, 18, 19, 20, 21, and 22, through which travels the conveyor chain 23, on which are supported the baking shelves 24. The chain passes around idler guide sprockets 25, as well as the driving gear 26 mounted on the shaft 27, and taking its drive through reducing gear 28 (Fig. 2) from the electric motor 29 supported on the bracket 30 at one end of the oven. The oven is heated by a circulating current of air which passes from the Perkins tubes 31 to the riser 32, thence to the top channel 33 overlying the top 34 of the baking compartments. Descending through these baking compartments, where it gives up its heat to the relatively cool dough, it descends to the lower portion of the baking chamber and emerges through the down comer 35 and returns through the opening 36 to the heating chamber 37, where it again comes in contact with the Perkins tubes 31. The ends of the latter project into a fire chamber 38 in the usual manner. The supply of heated air through the baking chamber may be completely shut off by the butterfly valve 39 arranged at the top of the riser 32 and controlled through the link 40 from the thermostat 41. By properly adjusting the latter it is possible to positively prevent overheating of the oven. The entry of the heated air from the top channel 33 into the several baking compartments is separately controlled for each compartment by means of separate slide valves 42 co-operating with the several perforated plates 43 arranged at the top of the baking compartments. Each valve 42 is operated through a link 44 fast on a spindle 45, which carries an exterior handle 46 for manual operation. It being thus possible to regulate the admission of the convection current to each compartment separately, it is obvious that the temperature of that compartment may be varied as desired to suit the requirements of the particular baking operation in hand.

At one end of the baking chamber, and in this case on a level with the bottom thereof, I provide a bay 47 into which the chain 23 is deflected and carried around the idler 48. Channels 49 may be secured in the sides of the bay to support the chain between the idler 48 and the idler 25 at the lower portion of the compartment 17. In order to permit inspection of the progress of the bake, the top of the bay 47 is made of glass 50, so that the operative may look down therethrough and observe the condition of the goods carried on the baking shelves.

Turning to Figs. 3 and 7 to 10, the details of the present shelf will be readily understood. As here shown, the shelf proper 51 is preferably of tile, slate, cement or stone of sufficient strength, while thin enough to afford ready heat transmission. In mounted position it forms a sector at the bottom of the end discs 52 of the shelf casing. Connecting the end discs extends an arcuate casing section 53 which reaches from the back edge of the shelf 51 to a point substantially above the center of the shelf. To complete the closure of the shelf casing, I provide an arcuate hood 54 which, in the closed position shown at A in Fig. 7, completely houses in the bread or other goods resting upon the shelf 51. There is thus formed on the shelf an enclosed chamber which is heated by radiation through the shelf bottom 51, fixed casing 53 and movable hood 54. The hood 54 is provided at its opposite ends with supporting legs 55, which are pivoted at 56 centrally of the end closure discs 52. As here shown these legs are angled to accommodate the trunnions 57 rigid with the end discs 52, and by which the shelves are supported on the traveling chains. These trunnions engage the notch 58 in the legs and like the pins 59 on the casing 53, form stops which limit the opening movement of the hood 54. The latter is shown in its fully open position at C in Fig. 7. It will be observed that, whereas in the closed position shown at A in Fig. 7, the direct heat in the baking compartment is excluded from the interior of the shelf casing, it has direct access to the goods resting on the shelf when the hood 54 is thrown open to the position shown at C in Fig. 7. In other words, the goods are now subjected to full top heat.

In some cases it is desirable to maintain a low bottom heat with full top heat. To secure this effect the hood is swung beneath the shelf 51 in opposite direction to that shown at C in Fig. 7. Its position is indicated in Fig. 10, where, as will be noted, it completely underlies the shelf so that the heat in the baking chamber can now reach the bottom of the shelf only through the hood and the air chamber confined between the latter and the bottom of the shelf. The mechanism for operating the hood 54 in these ways, is subject to various modifications. I have indicated devices which, when once set, automatically operate the hoods of the successive baking shelves as they pass a given point. Thus, the lever 60 pivoted at 61 at the entrance to the bay 47 is provided with an arm 62 lying within the bay and adapted to engage the pin 63 at the outer end of the supporting leg 55 at one end of the hood. When the lever is swung to engaging position, as indicated in Fig. 7 at B,

the shelves traveling in the direction of the arrow X, bring their pins 63 successively into engagement with the arm 62, with the result that their hoods 54 are swung open in the direction of the arrow Y to the position shown at C in Fig. 7. A second lever 64 on the spindle 65 has an arm 66 (arranged at the opposite side of the observation bay), which when turned to the position shown in Fig. 8 engages the pin 67 mounted on the leg at that end of the shelf and swings the hood 54 back to closed position as the shelf travels in the direction of the arrow R on its return to the oven after passing around the idler 48.

When it is desired to drop the hood to the position shown in Fig. 10 beneath the shelf, the lever 60 is moved to the position shown in Fig. 9, where a second arm 68 on its spindle 61 engages a dog 69 pivoted at 70 on the leg 55 and swings the nose 71 out of engagement with the stop 72, upon which the hood is supported in its closed position. The hood then drops by gravity to a position beneath the shelf, predetermined by the location of the stop pins 59a, in which position it remains until it is returned by the lever 73, pivoted at 74 and having an arm 75 adapted to be brought into the path of the pin 76 as the shelf travels in the direction of the arrow R. As the shelf passes the lever the hood 54 is swung up to its closed position, and the nose 71 of the dog 69 again snaps over the stop 72 under the action of its spring 77. Obviously when the hood is moved to the position indicated in Fig. 10, it shuts off the bottom heating to a great extent, but permits a high top heat for the goods resting on the baking shelf.

In modification shown in Fig. 11, the hood 78 is of sufficient extent to completely encase the space above the shelf proper 51. It is likewise supported upon pivoted legs 79, and is provided at its opposite ends with operating pins 80 and 81. The operating levers 60 and 64 may be the same as those for the construction shown in Figs. 7 and 8, which will serve in the same manner to open and close the hood. With this construction, however, when top heat is given, bottom heat is necessarily cut off by reason of the arcuate extent of the hood, which moves from its position against the stop 82, shown in full lines in Fig. 11, to the position shown in dotted lines in the same figure, and in this position the opposite edge of the hood passes beneath the shelf, thus cutting off the bottom heat to the shelf. It is not possible in this construction, therefore, to have at the same time both top and bottom heat, as in Fig. 8 of the construction first described, although full top heat with low bottom heat (as in Fig. 10) or full bottom heat and low top heat (at A Fig. 7) are available in both constructions.

The mechanism for securing the automatic discharge and re-charge of the shelves may be of any suitable character. I have indicated in Fig. 1 an automatic charging device comprising an inclined table 83, down which the pans 84 slide by gravity. The table 83 projects through the opening 85 in the end of the observation chamber into proximity to the baking shelves. Passing through the table 83 are stop bars 86 and 87 pivoted on opposite sides of the axis 88 of the rock lever 89. The end of the latter passes into the observation chamber into position to be engaged by the trunnions 57 at the ends of the shelves. As each shelf passes it deflects the rock lever 89 and thereby withdraws the stop bar 87, while projecting the bar 86. The forward group of pans 84 is thereby free to slide down the table and onto the shelf 51, the cover of which is now in open position. Upon the escape of the lever 89 from the trunnion, the latter is returned by spring 90 to normal position, and the bar 87 is thus projected into stop position to halt the succeeding group of pans 84. The swinging door 91 normally closes the feed entrance 86 against the escape of heat from the bay during the shelf-charging operation.

The discharge of the shelves is effected by the lever 92, having an arm 93 adapted to engage the forward edge of one of the end discs 52 of the self casing to tilt the shelf as it reaches position to discharge its baked bread or other goods by gravity onto the platform 94 down which it slides. The charging and discharging devices may be arranged at any desired point, or in any desired sequence with respect to the oven and the travel of the chain therethrough.

In Fig. 12 I have illustrated more or less diagrammatically a modified form of construction, in which the observation chamber 95 is located at the level of the floor 96, while the oven chamber 97 is located in a basement below the floor level. The charging and discharging operations at 98 and 99 are thus accomplished in a portion of the building removed from the baking chamber. This is highly desirable where the operation is to be performed in a sales room, as is not uncommon in many of the small bakeries. The oven chamber is here shown without subdividing partitions, and is heated by the products of combustion, or by radiation from the heating drum 100.

In Fig. 14 I have shown a still further modification in which the chain does not pass through the observation chamber under normal conditions, but is shifted to this position when it is desired to observe the progress of the baking operation. This is effected by mounting the idlers 101 and 102 on links connected to the arms 103 and 104 of a bell-crank lever mounted on a spindle 105 provided with a gear 106 meshing with

a pinion 107 operated by a hand lever 108. By operating the latter the bell-crank lever is swung on its axis 105 and the idlers 101 and 102 are moved in their guide slots 109 and 110, so that the idler 102 brings the chain to the position shown in Fig. 14, where the condition of the baked goods may be observed through the window 111.

The proofing chamber 112 is shown in Fig. 13 and, as in the case of the oven shown in Fig. 1, is subdivided by depending partitions 113 into several compartments through which the traveling chain 114, carrying the proofing shelves 115, passes. The tops of the compartments are closed by swinging doors 116 which may be independently operated to maintain the temperature of each compartment at the desired elevation. Beneath each compartment is a steam coil 117 connected to a feeder 118, through a valve 119, and by which the heat may be further regulated. The bread is deposited on the shelves at the bay 120 and is discharged at the second bay 121 at the opposite end of the proofing chamber. The proofing chamber may conveniently be arranged to discharge to the inclined table 83 (Fig. 1) leading to the baking oven, so that the whole proofing and baking operation is rendered continuous and automatic.

Various modifications of structure will readily occur to those dealing with the problem. The construction illustrated is, therefore, to be regarded as merely illustrative of the invention and in no way limitive, the invention being set forth in the following claims:

I claim:

1. For use with a baker's oven, a shelf adapted to be supported upon a travelling conveyor, said shelf comprising a support for the baked goods, end walls therefor, a fixed longitudinally extending wall and a pivoted longitudinally extending hood movable with respect to said longitudinally extending fixed wall to form therewith and with the end walls a closed chamber for the goods arranged on the shelf and serving to protect the latter from direct oven heat, and also movable to open position to expose the goods to said direct oven heat.

2. For use with a baker's oven, a shelf adapted to be supported upon a travelling conveyor, said shelf comprising a support for the baked goods, end walls therefor, a fixed longitudinally extending wall and a pivoted longitudinally extending hood movable with respect to said longitudinally extending fixed wall to form therewith and with the end walls a closed chamber for the goods arranged on the shelf and serving to protect the latter from direct oven heat, and also movable to open position to expose the goods to said direct oven heat, said hood in this latter position underlying the bottom of the support for the goods and serving to shield the latter from the direct oven heat.

3. For use with a baker's oven, a shelf adapted to be supported upon a travelling conveyor, said shelf comprising a support for the baked goods, end walls therefor, a fixed longitudinally extending wall and a pivoted longitudinally extending hood movable with respect to said longitudinally extending fixed wall to form therewith and with the end walls a closed chamber for the goods arranged on the shelf and serving to protect the latter from direct oven heat, and movable in opposite directions to expose the goods on the support to direct oven heat, said hood when moved in one direction underlying the goods support and serving to protect the latter from direct oven heat.

4. In a baker's oven, a baking chamber, a travelling conveyor, shelves mounted thereon, said shelves having movable hoods adapted to shield the goods resting on the shelves from direct oven heat, in connection with means to open said hoods during the travel of the conveyor together with automatic loading and unloading means arranged at a point spaced from said hood control means and independent thereof.

5. In a baker's oven, a baking chamber, a travelling conveyor, shelves mounted thereon, said shelves having movable hoods adapted to shield the goods resting on the shelves from direct oven heat, in connection with means to open and close said hoods during the travel of the conveyor together with automatic loading and unloading means arranged at a point spaced from said hood control means and independent thereof.

6. In a baker's oven, a baking chamber, an inspection bay opening thereto and through which the conveyor is adapted to pass during the baking operation, in connection with shelves on said conveyor adapted to support the goods to be baked, and means at said bay to effect the discharge of the baked goods carried by the shelves pivoted hoods for said baking shelves, said hoods being movable to closed or open position above the shelves, and means operable at will arranged at said bay to open said hoods to permit inspection of the goods on the shelves during the travel of the conveyor through said inspection bay.

7. In a baker's oven, a baking chamber, an inspection bay opening thereto and through which the conveyor is adapted to pass during the baking operation, in connection with shelves on said conveyor adapted to support the goods to be baked and means at said bay to effect the loading of goods so baked upon said shelves pivoted hoods for said baking shelves, said hoods being movable to closed or open position

above the shelves, and means operable at will arranged at said bay to open said hoods to permit inspection of the goods on the shelves during the travel of the conveyor through said inspection bay.

8. In a baker's oven, a baking chamber, an inspection bay opening to the top of said chamber at one end thereof and extending beyond the chamber, a traveling conveyor having a zigzag up and down course through the baking chamber, and horizontal reaches extending into said bay, together with means for discharging the baked goods at said bay.

In testimony whereof I have singed my name to this specification.

JOHN M. GANTVOORT.