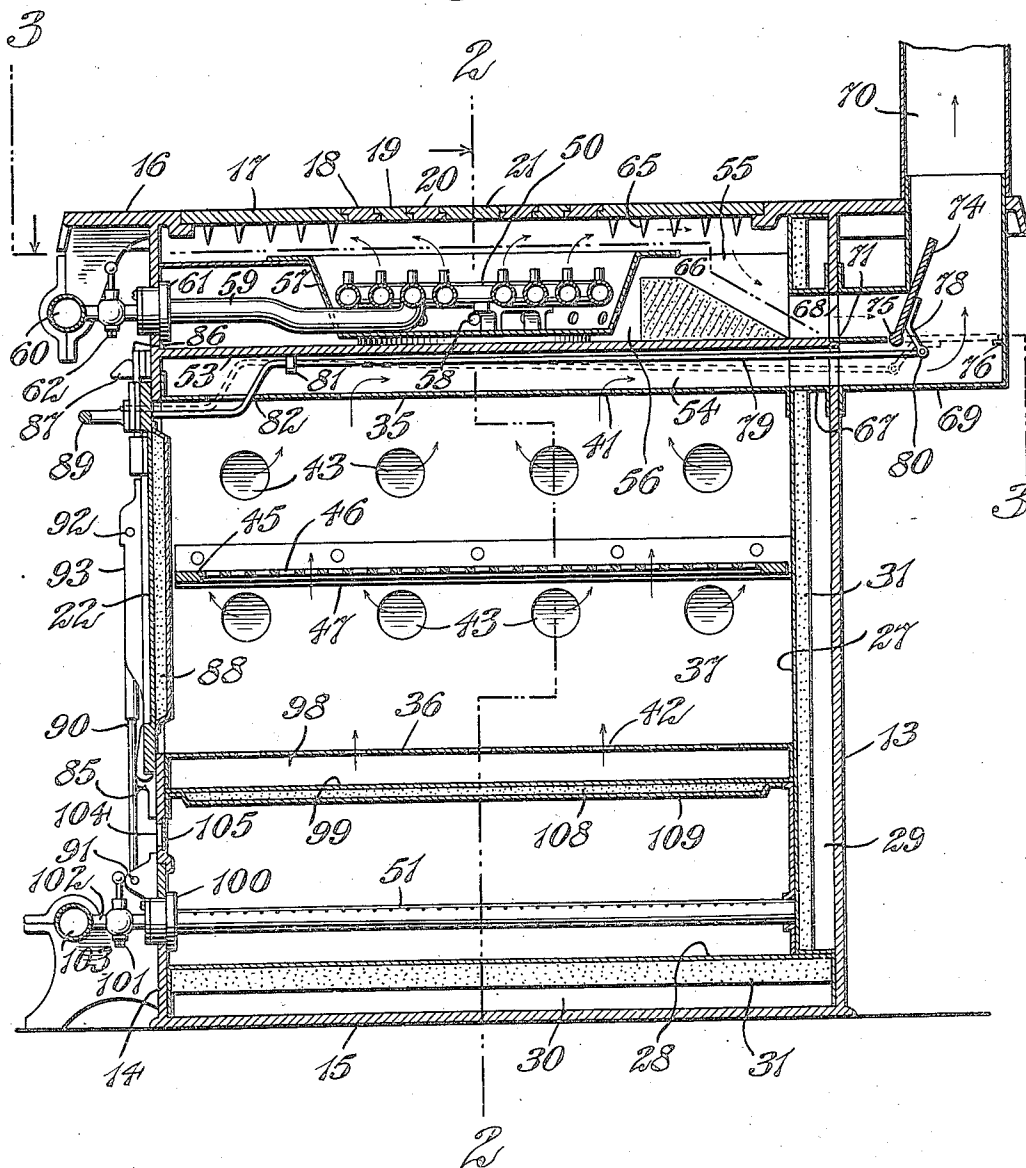


H. W. O'DOWD.
HEATING APPARATUS.
APPLICATION FILED OCT. 16, 1915.

1,224,497.

Patented May 1, 1917.
3 SHEETS—SHEET 1.

Fig. 1.



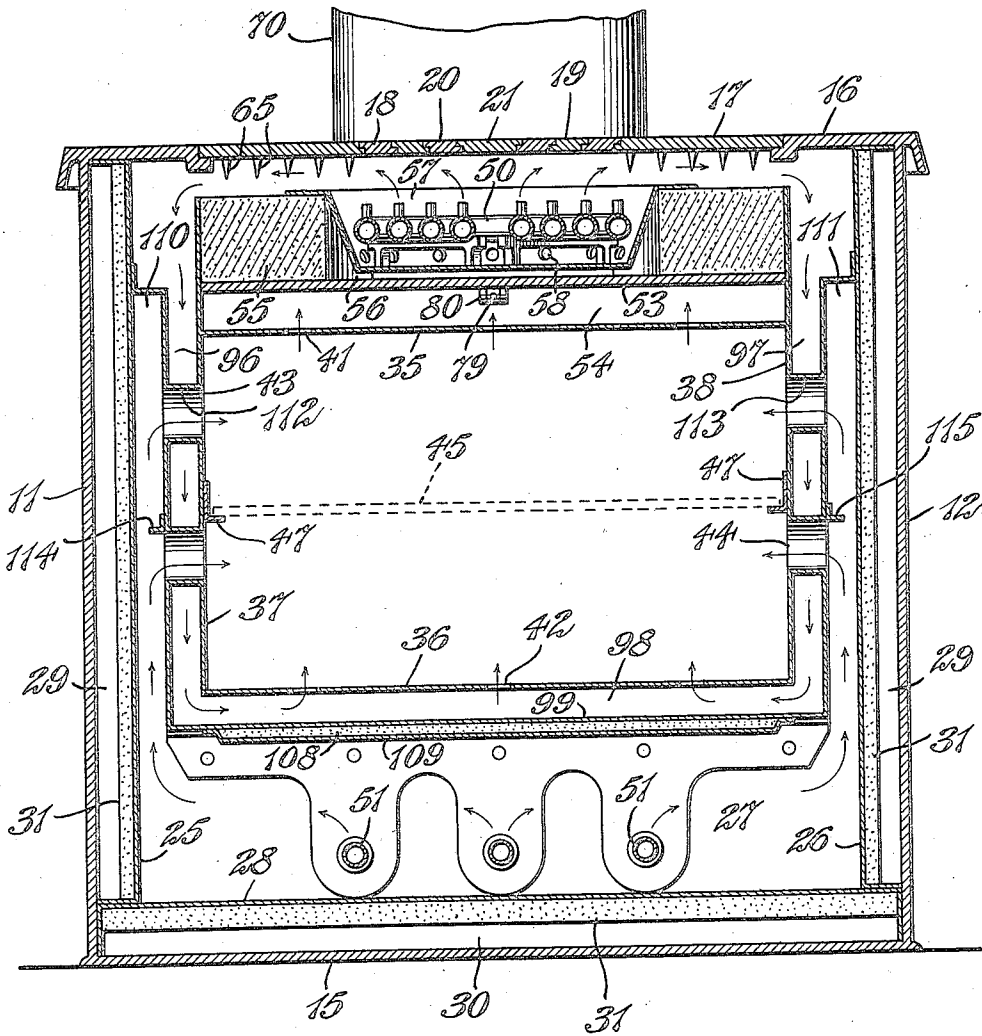
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Fig. 2.



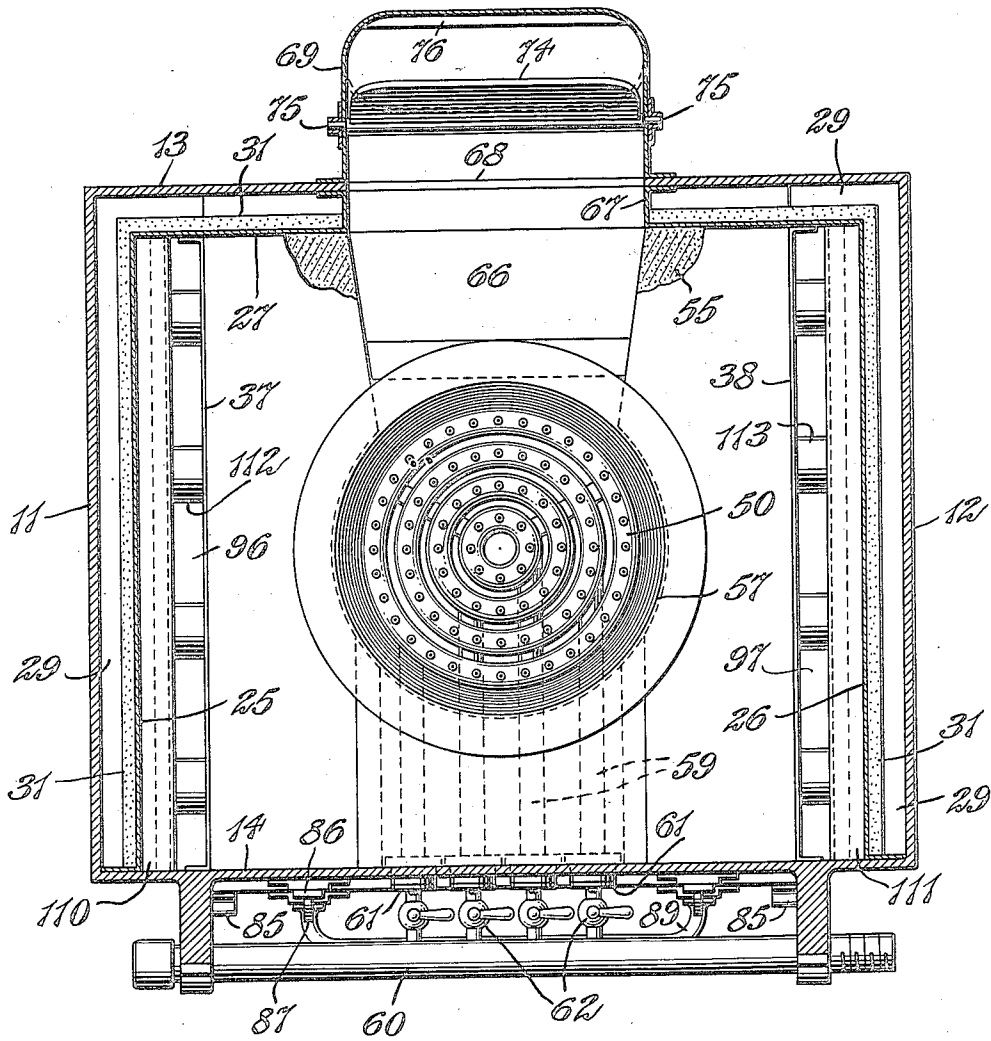
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

HENRY W. O'DOWD, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO WILLIAM M. CRANE COMPANY, A CORPORATION OF NEW YORK.

HEATING APPARATUS.

1,224,497.

Specification of Letters Patent.

Patented May 1, 1917.

Application filed October 16, 1915. Serial No. 56,189.

To all whom it may concern:

Be it known that I, HENRY W. O'DOWD, a citizen of the United States, and a resident of Jersey City, county of Hudson, and State of New Jersey, have made certain new and useful Improvements in Heating Apparatus, of which the following is a specification.

The present invention consists of an improved type of stove known in the trade as a double direct action cooking range.

Generally speaking, the invention may be said to have for its object to provide a stove or range of universal adaptation, possessed of several novel features that distinguish it from other apparatus of the same class and are productive of superior advantages.

Among other features, the said stove or range includes an oven heated both exteriorly and interiorly by currents merging therein.

Another feature of the invention is that it provides means for the exterior application of heat to the oven in opposite directions, the oven being surrounded by flue spaces permitting the passage of dual heat currents, which flow in double layers or strata upon the oven's sides, but are kept separate from each other by partitions guiding them in substantially parallel courses.

An additional feature is that the oven is heated by direct currents delivered simultaneously into its bottom and sides.

Still another feature is the provision of a blind flue standing at some distance from the side of the oven, and adapted to impound part of the heat currents that enter it prior to delivery into the oven's side. The impounded portion of the currents is utilized to strengthen other currents also supplied to the oven through the space intervening between the latter and the said blind flue. The word "blind", as used in this specification and the subjoined claims, is intended to indicate that the flue is closed at its upper end, and can discharge into the oven only to a partial extent, through a side communication.

A further distinguishing feature is that the said blind flue is adapted for lateral delivery into the oven at different levels, and means are furnished to reduce the volume of ascending heat currents within the

flue in proportion to the respective heights of these levels.

Other characteristic features of the invention will be easily recognized from the description thereof hereinafter contained, and will be duly pointed out in the claims terminating the specification.

Referring now to the drawings hereto annexed, which form an integral part of the description:—

Figure 1 is a sectional side elevation of a cooking stove or range showing one embodiment of the present invention;

Fig. 2 is a vertical transverse section of the same, on the irregular line 2—2 of Fig. 1, looking rearward; and

Fig. 3 is a sectional plan, taken from the irregular line 3—3 of Fig. 1, looking down.

Certain parts of the construction illustrated in the said drawings have already been set forth in a co-pending application for patent, filed by me on the 27th day of Jan., 1915, Serial No. 4,579, and therefore the same will be but briefly described herein, and only in so far as may be necessary or expedient, either to constitute a full disclosure of the invention or to bring out novel combinations formed between such elements as have been previously divulged and others that are strictly new. Such parts or elements, however, as are believed to be entirely original, and exposed for the first time in this specification, will be particularized.

In its preferred embodiment, the invention includes a quadrangular body portion composed of plates 11, 12, 13 and 14, constituting the sides, back and front of the stove, respectively. As shown, this body stands on a bottom plate 15, and it is covered by an apertured plate 16, furnished with reducing rings 17, 18, 19, 20, and a central lid 21. The front plate 14 has the usual opening to afford access to the interior of the stove, which is closed as by a door 22. The several plates may be all made separate and joined together by any suitable means, and when assembled they form, with the top and front closures, an outer casing wherein an oven and other parts, hereinafter described, are located.

Surrounding the oven and forming a jacket therefor in the said outer casing, is

another series of plates 25, 26, 27 and 28, which are respectively set parallel to the aforementioned plates 11, 12, 13 and 15. The opposite inner and outer plates, it will be observed, are connected to one another so as to produce double walls for the casing, at the back and sides thereof, and also a double bottom, with internal hollows or air-gaps, as 29 and 30. Sheets 31, of asbestos or like heat-absorbing material, line the inner plates within these hollows or air-gaps, and thus both the interior and the exterior plates are insulated, excepting the plain top and front, which are the same for the casing and the jacket. It is understood that the top of the stove is designed to let out rather than to confine the heat, to permit cooking at the surface, and the forward part of the stove does not need strong insulation, since it is relieved from excess of caloric by the draft being directed rearward, as will more clearly appear hereinafter.

As shown, the oven, before referred to, is located about centrally within the jacket aforesaid, extending for the full depth thereof from the front to the rear, but terminating laterally at some distance from each of the sides 25 and 26. This oven may be formed simply by four plates, as 35, 36, 37 and 38, constituting its top, bottom, and two sides, and arranged to abut against the forward plate 14 of the casing and the rear plate 27 of the jacket. The last-named plate (27) in that case will serve partly as the back of the oven, and the door 22, previously spoken of as a closure for the opening in the plate 14, will be the oven-door. The said four plates 35, 36, 37 and 38 may be supported from the adjoining parts of the jacket and casing in any approved manner, and preferably they are all apertured or perforated, as at 41, 42, 43 and 44, for purposes hereafter specified. Furthermore, the oven is divided into superposed compartments by a shelf 45, also apertured or perforated as at 46, and adapted to slide in and out of place upon lateral supports 47.

Above and below the oven are two heat-generating chambers, both adapted to discharge heat-currents directly into it. By preference, each of these chambers is equipped with an appliance capable of burning gas as the heat-producing agent, such, for instance, as a cluster of burners 50, and a set of detached burners 51, respectively situated within the upper and lower parts of the jacket that surrounds the oven. How the said chambers are laid out and arranged to heat the oven by gas will now be briefly explained.

The upper heat-generating chamber, to wit, the one located above the oven, is made preferably of the same depth and width as the latter, and in height extends from a base

plate or floor 53, set between the side plates 37, 38, up to the top closure of the outer casing, before described. The front plate 14 of the casing and the back plate 27 of the jacket therein constitute respectively the forward and rear walls of this chamber. The floor 53 is placed at some distance from the oven top 35, to form an intermediate flue 54, and supports a layer of firebrick or other refractory material, as 55, which fills the space inclosed by the upper ends of the plates 37, 38, and opposite portions of the plates 14, 27, with the exception of a central recess 56, reserved for a fireplace. A pan 57, flanged over the firebrick and designed to contain the before-mentioned cluster of gas-burners 50, is suspended within the recess 56. The burners 50 may be composed of concentric annular members, separately operable as shown. They are suitably supported in the bottom of the pan 57, above a series of air-openings 58, and provided each with a feed-pipe, as 59, connecting with an outer supply-pipe 60, in front of the stove. The several feed-pipes, it will be seen, are furnished with the customary air-mixers 61 and rotary plug valves 62, and reach their respective burners, from the supply-pipe, through appropriate apertures made in the upper part of the forward plate 14, the firebrick 55, and the pan 57.

From the cluster of gas-burners 50, the flames naturally impinge, or throw up their heat, against the underside of the lid 21 and the adjacent rings 18, 19, and 20, or against such utensils as may be placed instead directly over the fire. As the gas burns, the heat spreads to the neighboring outer ring 17, which is formed with depending prongs 63, opposite the underlying firebrick 55, and thereby enabled to collect a very material amount of the outflow of caloric, with the result that the stove is properly heated throughout its surface. If no cooking be done elsewhere than at the surface, and an intense heat be not desired, the products of combustion and overplus of caloric are at once eliminated, by opening a damper-controlled exit provided rearward near the top of the stove. This exit includes a passage 66, cut into the firebrick 55; a short tubular connection 67, leading therefrom to an aperture 68 in the back plate 13 of the casing; an elbow 69, registering with this aperture; and an outlet-pipe 70, fitted to the elbow. Like the exit passage 66, the previously mentioned flue 54 also is made to discharge into the tubular connection 67 and aperture 68, but on the opposite side of the floor 53, which is slightly extended outward, as at 71, for the purpose of keeping separate the communications that lead from the passage and the flue to the exterior of the stove.

A damper 74 is placed in the elbow 69, close to the outer end of the floor extension

71, where it is pivotally connected with the sides of the elbow, as at 75. This damper is designed to be operative both in a horizontal and in a vertical position. When turned down flat, substantially on a level with the floor 53 and the extension 71 thereof, it shuts off the outlet from the flue 54, and its free edge then is made to rest upon a ledge 76, provided in the elbow. When turned up, it is brought to bear against the inner bend of the elbow in such a way as to cut off the communication of the exit passage 66 with the outlet. Thus the damper controls both the flue and the exit passage, operating alternately to close the one and to open the other.

Preferably, the said damper 74 is arranged so as to swing down by gravity to its horizontal position, and to be raised by positive means to the vertical position. To this end, the pivots 75 are located at or near the inner edge of the damper, so that the outer edge thereof will naturally gravitate toward the ledge 76; and the damper is further provided on the under side with a downwardly projecting arm 78, to which a push-rod 79 is hinged, as at 80. Thus, if the rod 79 be released, the damper will fall of its own weight until it meets the ledge 76 and stops the flue 54, as indicated by dotted lines in Fig. 1, the exit passage 66 thereabove being meanwhile open to the outlet, and the rod shifted forward, also as represented by dotted lines. If the rod be pushed back, the damper will be swung upward until it shuts the exit passage and opens the flue to the outlet. The push-rod is conveniently arranged for operation by the oven-door 22, with which its free end is adapted to contact. As seen in the said Fig. 1, the rod 79 extends from the arm 78 forwardly inside the flue 54, where it is supported by a guide 81, and thence it passes through a slot 82 in the plate 35, down into the front part of the oven, in position to meet the door 22, when closed. The closing of the door operates to push back the rod and raise the damper, whereas if the door is opened or kept open, the rod will advance and the damper be dropped.

The oven-door, above referred to, may be of any approved type, though it is shown in the annexed drawings as appertaining to the drop-door variety. As illustrated, this door is adapted to swing downward, upon hinges located along the bottom margin of the opening in the front plate 14, as at 85, Figs. 1 and 3, and it is held at the top by a latch 86, that engages a cam-faced catch 87, on the said plate. The inner face of the door has a lining 88, of asbestos or analogous heat-absorbing substance, projecting into the entrance to the oven. On the outside, the door is provided with a transverse handle 89, near its upper end, by means of which it can be pulled open or returned to closed po-

sition, as desired, and it is further equipped with telescoping shock-absorbers, as 90, on opposite sides, in order to take up the concussion due to brusque manipulation. Each shock-absorber has a hinge connection with the plate 14, as at 91, and it is similarly connected as at 92, to a flange 93, on the door 22. These features of construction, although novel, will not be claimed herein, as they are already covered by other applications for patents.

Part of the heat from the upper generating chamber can be used for heating the oven, whether or not any cooking be done on the surface of the stove. Flues 96, 97 and 98, connecting the chamber with the oven, are provided for this purpose. The flues 96 and 97 extend from the top plate 16 of the casing, down by the sides of the oven to the bottom thereof, and discharge into the flue 98, which is formed between the oven bottom plate 36 and another plate 99 thereunder, constituting the ceiling of the lower heat-generating chamber, next to be described. From the flue 98, which is thus horizontally disposed and arranged transversely with relation to the flues 96 and 97, the heat units rise into the oven through the apertures 42 in the oven bottom plate 36, and after ascending to the top plate 35, pass up through the apertures 41 in the latter, into the intermediate flue 54, under the base plate or floor 53 of the upper heat-generating chamber. It is understood, of course, that the oven-door 22 is then closed, and the damper 74 has been raised thereby, in the manner already explained, into the position represented by full lines in Figs. 1 and 3, so that the outlet for the products of combustion and the spent heat units is stopped at the passage 66, but is open at the rear end of the intermediate flue 54. The draft in that case is downward from the upper fireplace by the sides of the oven, up through the latter from the bottom to the top thereof, thence into the flue between the oven and the chamber thereabove, and rearwardly out of this flue past the raised damper. Much heat, which otherwise would go to waste, is thus saved and utilized, by leading and drawing it down from the top fire, and up through the oven beneath.

The lower heat-generating chamber, that is, the one below the oven, takes in the entire bottom part of the jacket before described, occupying the space inclosed by the lower portions of the plates 25, 26 and 27, at the sides and back of the jacket, the corresponding portion of the front plate 14 of the outer casing, the jacket's bottom plate 28, and the plate 99, hereinabove referred to as the ceiling of the chamber. The burners 51, also spoken of hereinbefore, are placed parallel to one another in this chamber, extending from the front to the back plates

thereof, from which they are suitably supported at the ends, as shown. These burners also are separately operable, having each an air-mixer 100, a rotary plug valve 101, and a feed-pipe 102, connecting the same with a gas supply pipe 103, mounted forwardly of the stove. The action of each can be observed through one or more apertures, as 104, closed with mica, as at 105.

10 Directly above the set of burners 51, under the said ceiling 99 of the lower heat-generating chamber, is placed an insulating mat or shield 108, of asbestos or equivalent fire-proof material, held to the ceiling by an underlying plate 109. This mat or shield and the sustaining plate thereof moderate the effect of the flames from the gas-burners upon the lower flue 98, to which they transmit considerable heat, and thence to the oven above, by radiation. The heat units that are not absorbed, and thus transmitted, it will be observed, are deflected by the plate 109 and conducted laterally toward the side plates 25 and 26 of the jacket.

25 The heat units which are laterally deflected by the plate 109, as just noted, are led thereby into side flues 110 and 111, located exteriorly of the before described flues 96 and 97, respectively, and extending upward, within the jacket, to opposite points substantially on a level with the floor of the upper fireplace. While running in reverse directions, the flues 110, 111, lap over the flues 96, 97, and divide up equally with them the spaces intervening between the sides of the jacket and the sides of the oven directly opposite. The outer flues 110, 111, are "blind" in the sense that they are closed at their upper ends, which thus form pockets wherein the ascending heat units accumulate, and assist by conduction and indirect transmission in maintaining the flow of caloric through and across the inner flues 96, 97, in a high state of efficiency. Tubular passages, as 112 and 113, connect the outer flues with the previously mentioned apertures 43 and 44 in the sides of the oven, transversely of the inner flues, thereby affording direct communication between the lower heat-generating chamber and the oven on both sides. Preferably, these passages are provided at different levels, above and below the shelf or shelves 45 of the oven, and are separated by deflectors, as 114 and 115, projecting into the outer flues so as to diminish the flow of heat units therethrough in proper ratio to the height of the several passages. The draft of the lower heat-generating chamber is identical with that of the upper heat-generating chamber, when the oven-door is closed and the damper raised.

65 It has already been stated that the heat from the upper generating chamber can be used in part for heating the oven. But, to explain more fully the operation of the stove

in this respect, it should be added that the damper 74, previously described, is an important factor in producing the draft necessary to start an effective circulation of the heat currents for the purpose in view. When the stove is cold, it is difficult at first to bring the currents of heat from the upper generating chamber down into the oven. Experience has demonstrated that this difficulty is best overcome by opening the damper and allowing the heated products of combustion to pass directly from the upper chamber into the outlet connected with the chimney, instead of closing the damper with the idea of forcing the heat currents down at once into the oven and thence into the chimney outlet. The latter becomes warmed more rapidly by keeping the damper open for a certain interval of time, and a greater suction is exercised on the flues around the oven. As before noted, the damper is open to the upper heat-generating chamber whenever the oven-door is opened. As the damper falls into its horizontal position on the opening of the door, it affords a free egress for the products of combustion.

The invention, in its broader aspect, is not restricted to the precise details of construction and arrangement of parts herein disclosed, nor to any specific manner of carrying it into practice, as manifestly numerous changes and modifications can be effected without departing from the underlying principles of the invention, or sacrificing any of its chief advantages.

I claim:—

1. A stove, including in combination, an oven apertured at the bottom, a radiating element thereunder, an upper source of heat, and means for conveying the heat from said source down upon said element and thence into the oven.
2. A stove including an oven with an apertured bottom, a flue open at the aperture therein, a radiating element on said flue opposite said aperture, an upper heat generating chamber, and means for conveying heat from said chamber down upon said element.
3. A stove including an oven provided with apertures at top and bottom, a radiating element under the same, an upper source of heat, and means for conveying the heat from said source down to said element along opposite sides of the oven and up through said apertures.
4. A stove including a source of heat, an oven thereabove, an intermediate radiating element, means for conveying a current laterally to said oven past the under side of said element from said source, and other means directing a similar current against the upper side of the radiating element beneath the oven.
5. A stove including an oven with apertures in its bottom and sides, means for con-

veying heat currents exteriorly from the top of said oven to the apertures in the bottom thereof, and separate means leading other heat currents from a point beneath the oven upwardly into its sides.

6. A stove including an oven apertured both laterally and at the bottom to permit double direct action of heat therein, sources of heat above and below the same, and separate means for conveying currents to the oven's apertures at points remote from each one of said sources.

7. A stove including a laterally apertured oven, a flue spaced therefrom leading a heat current in an upward direction, another flue conveying a similar current downwardly between the oven and said spaced flue, and means discharging heat from the latter into the aperture in the oven's side.

8. A stove including an oven apertured at the sides and bottom, flues leading heat currents upwardly at some distance from each side of said oven, other flues conveying similar currents down intermediately of said flues and of the oven sides, and transverse passages respectively connecting the side and bottom apertures of the oven with the different flues.

9. A stove including an apertured oven, a blind flue arranged to deliver heat currents into the aperture thereof, and means exteriorly heating said flue adjacent to its point of delivery.

10. A stove including an oven with apertures at different levels for direct admission of heat currents therein, a spaced flue conveying said currents to said apertures, means for heating the space between said oven and said flue, and a closure for the latter forming a pocket designed to accumulate part of the currents within and to be heated without in proximity to the higher one of said levels.

11. A stove including an oven formed with side and bottom apertures, a flue arranged to discharge heat currents into said oven through its side aperture at some distance from the bottom thereof, an upper source of heat, a passage extending under the oven from said source in reverse direction relatively to said flue, and means positioned opposite the bottom aperture of the oven for collecting thereunder the currents conveyed by said passage at the farthest points from the heat source.

12. A stove including an oven with bottom and side apertures, a flue positioned to lead ascending heat currents into the oven's side, a reversely directed flue serving to convey descending heat currents into the oven's bottom, and means connected with said flues for collecting portions of said currents in the vicinity of their respective discharges.

13. A stove including an oven apertured laterally and at the bottom, heat chambers

below and above the same, an upturned flue leading the heat from the lower chamber into the aperture in the oven's side, a closure for said flue forming therein a pocket for heat currents collecting about said aperture, a downwardly extended flue conveying the heat from the upper chamber to the aperture in the oven's bottom, and a heat collecting element positioned beneath said bottom aperture at the under side of the latter-named flue.

14. A stove including an oven apertured at the bottom and side, a blind flue spaced from said side leading a heat current exteriorly of said oven up to a point near the top thereof, an upper chamber intermediately heating the oven from its said top to its said bottom, passages respectively discharging part of said current into the interior of the oven from said flue, and means operating to reduce the upward flow of heat through the latter in proportion to the respective height of said passages and in inverse ratio to the distance from said chamber.

15. A stove including an oven apertured laterally and at the bottom, a jacket therearound, and flues between said jacket and said oven adapted to convey separate currents of heat to the side and bottom apertures of the latter, respectively.

16. A stove including an oven with side and bottom apertures, a jacket surrounding the same, and flues within said jacket covering said oven from the opposite ends thereof to its said apertures so as to heat it both exteriorly and interiorly.

17. A stove including an oven apertured laterally and at the bottom, a jacket therefor, sources of heat at opposite ends of said oven within said jacket, and juxtaposed flues inside the latter discharging currents from said sources into the oven's apertures directly.

18. A stove including a casing, a jacket spaced inwardly therefrom, an apertured oven within said jacket, and heat-conveying means inside the latter adapted to discharge into the bottom and side of said oven simultaneously.

19. A stove including an oven apertured at the bottom and top for the passage of heat currents therethrough, a heat chamber above said oven, a flue for conveying currents downwardly into the oven from said chamber, a direct exit from the latter, a discharge out of the oven for the currents from said flue, an outlet common to both said exit and said discharge, and a damper capable of cutting off communication between either the exit or the discharge and said outlet.

20. A stove including an oven apertured at top and bottom, a source of heat thereabove, a flue adapted to convey currents into said oven from said source, a separate exit

- for products of combustion from the latter, a discharge for said currents out of the oven, an outlet common to both said exit and said discharge, a damper functioned to cut off the communication between either the exit or the discharge and said outlet, and a door for the oven automatically controlling the operation of said damper.
21. A stove including an oven apertured for the passage of heat currents there-through in a vertical direction, a heat chamber above the same, a direct egress for currents tending to ascend from said chamber, means adapted indirectly to convey descending currents from the latter into said oven, an outlet for both species of said currents, and an automatically operated damper serving to shut off either the ascending or the descending currents from said outlet.
22. A stove including an oven with top and bottom apertures, a heat chamber thereabove, a flue leading from said chamber downwardly alongside of said oven, a transverse passage extending under the oven from said flue, and means capable of inducing a current down the latter into said passage and up said apertures from the heat chamber.
23. A stove including a heat chamber, an oven thereunder having top and bottom apertures, laterally closed flues leading downwardly from said chamber on opposite sides of said oven, and a transverse flue arranged to discharge into said bottom apertures from the lower ends of said first-named flues.
24. A stove including an oven with apertures in its top and bottom, an upper heat generating chamber, flues open to said apertures respectively located above and below said oven, means conveying currents from opposite sides of said chamber into the lower one of said flues, and other means operating to draw from the upper flue.
25. A stove including an oven apertured laterally and at the bottom, heat chambers above and below the same, and juxtaposed flues arranged to convey currents in opposite directions from said chambers to the apertures in the side and bottom of the oven conjointly.
26. A stove including an oven with side and bottom apertures, heat chambers above and below the same, lapping flues extending on opposite sides of the oven from said chambers, the outer flues discharging into the apertures in the oven's side, and another flue connecting the inner ones of said lapping flues across the oven on the underside so as to discharge into its bottom apertures.
27. A stove including an oven apertured laterally and at the bottom, a heat generating chamber thereabove, a set of flues leading down the sides of said oven from said chamber, another heat generating chamber below the oven, a second set of flues discharging from the latter-named chamber into the oven's sides, and a transverse flue open to the oven's bottom connecting the flues in said second set.
28. A stove including an oven with top, bottom, and side apertures, heat generating chambers above and below the same, inner and outer sets of flues discharging from said chambers into the bottom and sides of the oven respectively, and an intermediate flue in communication with the upper part of the oven.
29. A stove including an oven apertured at the top, bottom and sides, heat generating chambers above and below said oven, vertical flues discharging into the bottom and sides of the latter from said chambers, a horizontal flue open to said top, and means operating to draw outwardly through said horizontal flue.
30. A stove including oppositely located heat generating chambers, an oven therebetween apertured at the bottom, sides and top, flues discharging from said chambers into said bottom and sides respectively, an intermediate flue open to said top, and means operating to draw rearwardly outward from said intermediate flue.
- In testimony whereof, I have signed my name to this specification.

HENRY W. O'DOWD.