

1,001,637.

Patented Aug. 29, 1911.

Fig. 1.

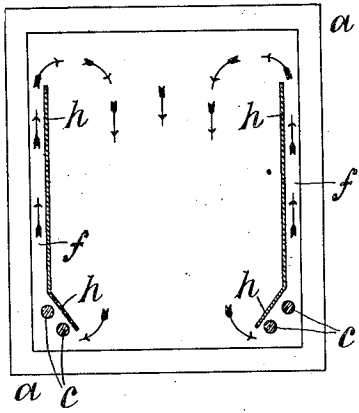


Fig. 3.

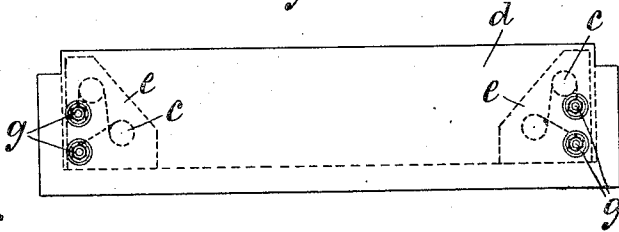


Fig. 2.

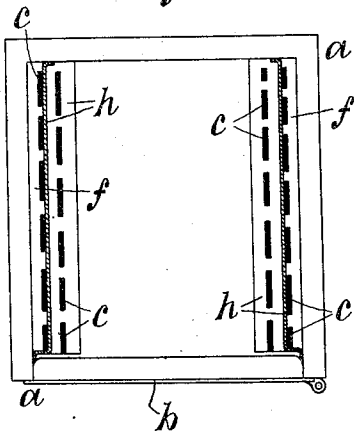
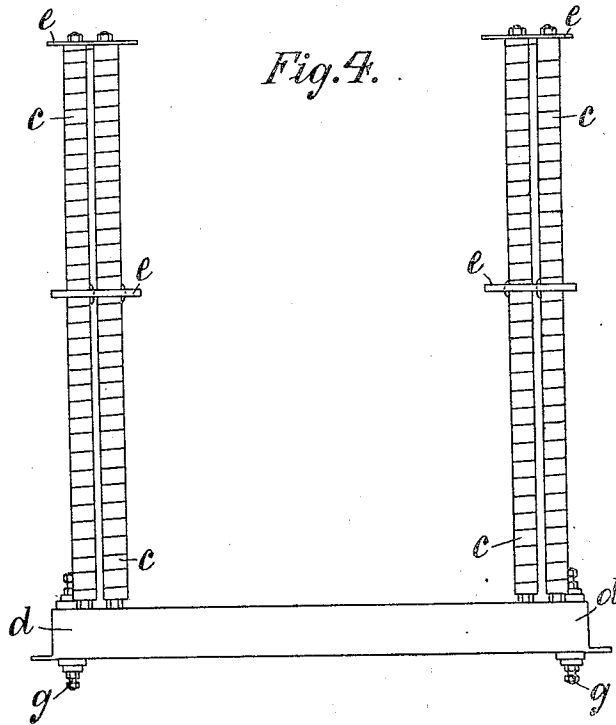


Fig. 4.



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# UNITED STATES PATENT OFFICE.

HAROLD GRAY, OF ACCRINGTON, ENGLAND.

ELECTRICAL OVEN.

1,001,637.

Specification of Letters Patent. Patented Aug. 29, 1911.

Application filed April 20, 1911. Serial No. 622,353.

*To all whom it may concern:*

Be it known that I, HAROLD GRAY, a subject of the King of England, residing at Accrington, in the county of Lancaster, England, have invented certain new and useful Improvements in Electrical Ovens, of which the following is a specification.

This invention has reference to ovens in which electric current is used as the heating medium.

The object of the invention is, primarily, to provide an oven which will not only cook the edibles satisfactorily, but to provide one which is simple and inexpensive in which the amount of current employed, and consequently the cost of it for cooking given articles shall be such as to compete successfully—at the usual prices charged for electric current by public bodies—with gas as a cooking medium, and so bringing electric ovens within the reach of the majority of householders, and on a parity both economically, and in culinary qualities, with gas cookers.

I am well aware that there have been a great many proposals for, and designs of electric ovens made, but none hitherto proposed or introduced have been such as to meet and fulfil the conditions required of them, in the sense and directions referred to; and, as above stated, the object of the present invention has been primarily to do so.

In the following description of electric oven, the improvements hereunder are comprised. In this oven, the cooking is effected through the combined agency of electric energy, transformed into heat, and hot currents of air, the heat of which is received from the electrically heated parts or "units" over which it is caused to flow automatically; and these currents of air are produced and caused to flow in a continuous circulation, over, and then away from the electrically heated units or parts, within and through the cooking chamber itself of the oven, and over the articles being cooked, and back to the said electrically heated parts; so that the cooking is effected within a closed heat cycle within the cooking chamber itself, wherein the total heat energy supplied to the oven is transferred to the air, and no heat energy can escape, practically or is wasted; all being passed into the articles being cooked.

In the accompanying drawings, the im-

provements above described, as well as those hereafter specified, are illustrated.

In these drawings Figure 1 is an elevation in section, and Fig. 2 a plan in section, in diagram, of the oven; and Figs. 3 and 4 are end elevation and plan, respectively, of the heating units, shown to a larger scale.

Referring to the drawings, *a* represents the body or casing of the oven, which may be assumed to be of metal with heat insulating material inside or outside, or arranged in any suitable way, for preventing escape of heat; *b* is the door of the oven chamber, which will also be provided on its inside or otherwise with suitable heat insulating material; and *c* represents the electrically heated units or parts. These units, in the case shown, are carried from a carrier or support *d*, which extends across from side to side, and fits in the lower part of the oven chamber; and it is more or less in the form of a drawer, and is capable of being slid into and out of position, as may be desired. Current is supplied to and from the units through the terminals *g*. These electrically heated units may consist of resistances; and they are supported at points within the carrier *d* by supports *e*, which rest on the bottom of the oven chamber *a*, and prevent the units sagging. These units come at the lower angles of the oven chamber *a*; and the air heated by them is conducted up by and through a conduit *f* on each side (or it may be on the back, or sides and back, or any of them), the conduits being formed by the introduction of a plate *h* extending upward from a point near the bottom of the oven chamber to about the level shown; the lower part of the plates *h* being inclined outward and inclosing or covering in above the heat units *c*. The air heated by the units *c* will pass up through the conduit *f* from the lower portion, and discharge over the upper edge of the conduit plates *h*, and then fall downward in a distributed body through the oven chamber, to the lower portion, where it again passes to the units in right or left streams under the lower edges of the inclined portions of the conduit plates *h*, when it is reheated, and the operation repeated. The air circulation is automatic, and the closed action continues so long as current is supplied.

Within the oven space, between the conduit plates *h*, the usual trays or the like for supporting the articles to be cooked will be

disposed and the hot air will pass down over them, and these "top-heat" hot streams or currents of air, constitute the main cooking agent in the oven.

5 This invention provides, in an electric oven, controlled convection currents (in contra-distinction to confusion convection currents), and by it, a high degree of improvements in the cooking is obtained, and  
10 which is not otherwise obtainable. Moreover, in the cooking action, there is no necessity to change the position of any of the articles being cooked as they become cooked all over in the required manner, and  
15 quicker than with other systems. By the improved construction the hot air strikes the upper surface of the material to be cooked, and gives the desired effect of "top heat," as well as providing an oven by  
20 which a given quantity of food to be cooked can be cooked with a relatively small quantity of current.

With regard to the casing of the oven, and the manner of limiting to a high degree, the passage of heat through it, this  
25 may be provided with or effected in some cases by using sheets of metal, and sheets of heat insulating material, such as asbestos, slag wool, or other suitable material, and by  
30 pressing a plurality of these laminæ of metal and insulating material into one compound plate, of which the oven or stove may be built fully or partially. The laminated plate may be so formed that the  
35 oven body, or several parts of the body, may be formed in one piece; that is to say, the plate may be cut and pressed or bent into the shape required; or it may be made of separate laminated plates. The sheet  
40 metal plates may be thin, and the number of laminæ may be any required; but generally there will be several of such laminæ of metal and insulating material.

Where desired, ventilating means of any known suitable kind may be provided on the oven, so that a change of the atmosphere may be made at will, if required.

It is to be stated that it has been heretofore proposed to deliver hot air, heated by  
50 electrical heating units into the upper part of an oven, and withdraw it from the bottom, and so circulate it; also to provide cooking ovens with removable electric heating units within them; and therefore no  
55 broad claim is made to any of such features *per se*; but under this invention the air is heated in the lower part of the cooking chamber proper of the oven, and is caused to circulate up through conduits within,

namely, at the sides, or sides and back or front, of the cooking chamber, and delivered from the top of said conduits at and over the uppermost or top part of this cooking space; and being evenly distributed by these means, falls in an evenly distributed column  
65 down through the whole of the cooking space between the conduits, to the bottom of-same, and there re-directed over the heating units; and so on it is caused to act continuously in the manner described. One of  
70 the chief effects and advantages of this arrangement, by which the circulation of hot air is carried on entirely within the cooking chamber of the oven itself, is that a relatively small quantity of electric current  
75 is required to cook a given quantity of food; and economy of current is of great importance; and by keeping the heating of the air, and the whole of its circulation, within the cooking chamber proper of the oven, dis-  
80 sipation or loss of heat, and thus electrical energy, is avoided.

What is claimed is:—

1. In an electric cooking oven, the combination of a casing, partitions in and spaced from the walls of the casing to form  
85 flues, said partitions constructed at the bottom and top of the casing to provide air inlet and outlet passages for the flues, electric units located at the bottom of each flue  
90 adjacent the air inlet whereby the ingoing current of air will be heated and ascend and pass through the outlet at the top to the interior of the casing to again be subjected to the heating influence of the electric units.  
95

2. In an electric cooking oven, the combination of a casing, a door therefor, partitions in and spaced from the walls of the casing to form flues, the lower ends of the  
100 partitions inclining inwardly and terminating short of the bottom of the casing to form inlet openings to the flues, the upper ends of the partitions terminating short of the top of the casing to form outlets from the flues, electric heating units mounted in  
105 the bottoms of the flues adjacent the inlets thereto, and a frame connecting the electric heating units, the flues forming passages for the heated air to enter at the bottom and ascend and be delivered in continuous cur-  
110 rents to the interior of the casing.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HAROLD GRAY.

Witnesses:

ERNOLD SIMPSON MOSELEY,  
GEORGE WEAVER.