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HEATING APPARATUS

Filed June 8, 1921

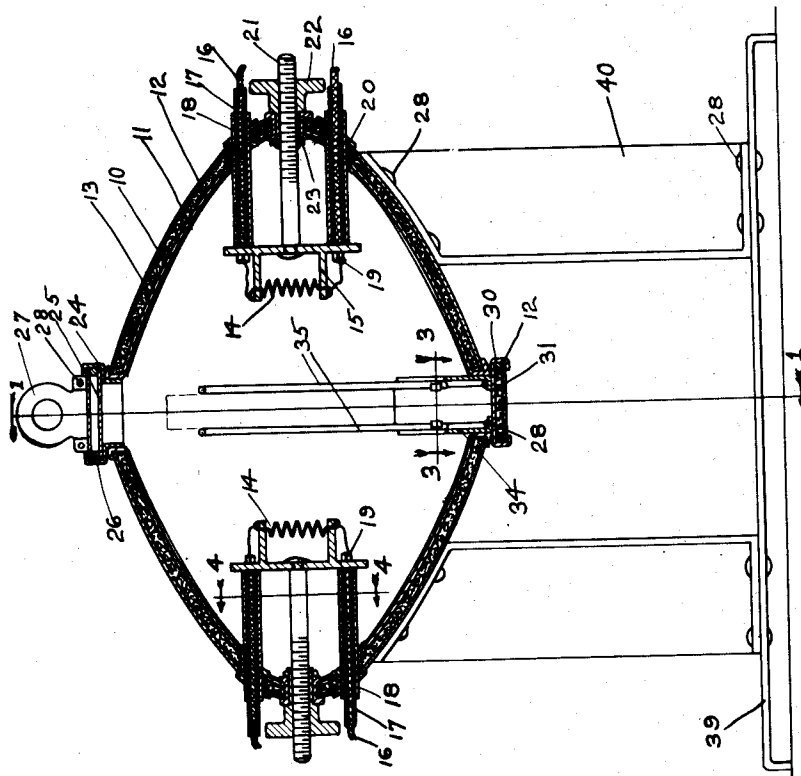


Fig. II

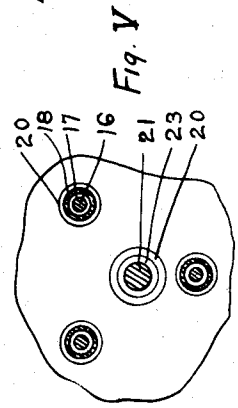


Fig. V

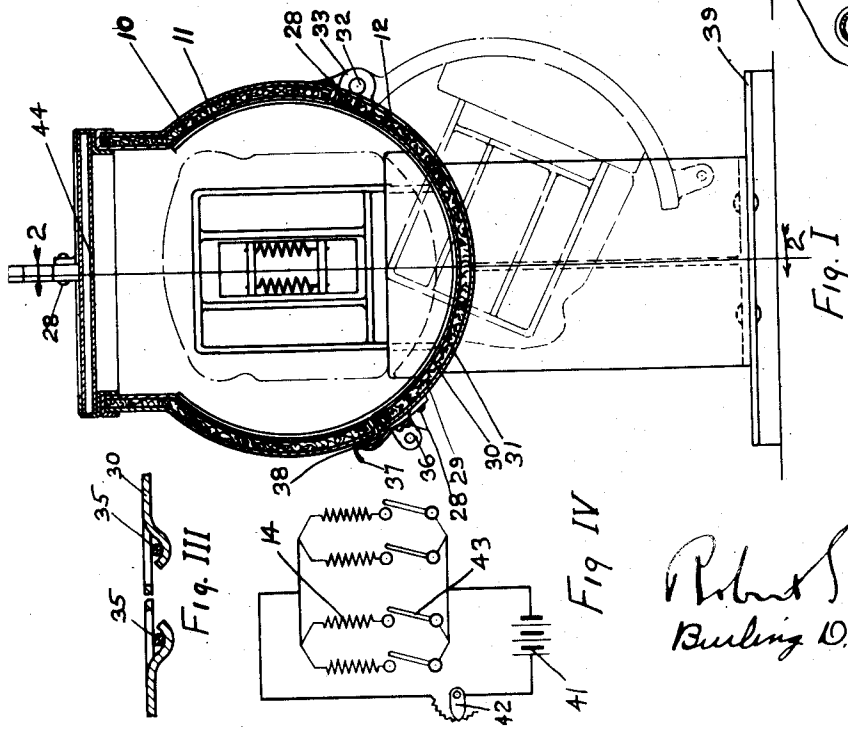


Fig. I

Fig. III

Fig IV

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UNITED STATES PATENT OFFICE

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HEATING APPARATUS

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This invention relates to heating apparatus and with regard to certain features more particularly to apparatus where it is desired to concentrate the heat at a given point.

One of the objects thereof is to provide an apparatus of simple and durable construction and efficient in action. Another object is to provide an apparatus wherein all heat which is radiated from the source of heat is made use of to the best advantage. Another object is to provide a method of heating apparatus construction eliminating the tendency of the cold air surrounding the apparatus to pass through it thus reducing heat losses from the apparatus by convection to a minimum. Another object is to provide apparatus of such type as have a self-contained source of heat within them with means adapted to direct all the heat devolved from the source of heat to the point where the most efficient use may be made of it. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and in the art as in the various steps hereinafter illustratively described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one of the various possible embodiments of this invention, Figure I is an end elevation in cross section of an electrically heated toaster, the cross section being taken along the line 1—1 in the direction as shown by the arrows in Figure II. Figure II is a side elevation of the electrically heated toaster shown in Figure I, the cross section being taken along the line 2—2 in the direction as shown by the arrows in Figure I. Figure III is an enlarged detail in cross section of the toast support, the section being taken along the line 3—3 in the direction as shown by the arrows in Figure II, the cross section clearly shows the method of attaching the wire grids of the toast support to the metal work of the toaster proper. Figure IV is a diagrammatic plan of the electrical connections, the switches and the source of supply of electrical energy of the toaster shown in Figure I. Figure V is a cross section of the supporting members of the grid upon which the heating elements are mounted, the section being taken along the line 4—4 in the direction as shown by the arrows in Figure II.

Similar reference characters refer to similar parts throughout in the several views of the drawings.

Turning now to Figure II we have at 10 a casing the inner surface of which forms a double elliptical reflector, the polished reflecting surface being protected by a thin layer of glass 11 or a layer of clear quartz cemented or blown thereon so as to exclude air from between the adjacent surfaces of the reflector and its protecting coating 11. The outer surface of the elliptical reflector 10 is lagged with a layer of heat insulating material 12 such as magnesium oxide or asbestos which is protected from abrasion or damage by a thin pressed metal sheathing 13. At each focus of the double elliptical reflector 10 there is arranged a pair of heating elements such as 14 mounted upon the supporting grid 15 made of heat resisting material, nonconductive to electricity, the supporting grids 15 are fastened to three rods such as 16 which are surrounded by the heat resisting insulating sheaths 17 which, in turn, are surrounded by a thin metal tube such as 18, the assembly being secured to the supporting grid 15 by a threaded end on the rods 16 passing through a lug thereon and is retained thereon by a nut such as 19. The bushing 20 surrounds the tubes 18 where they pass through the elliptical reflector 10 and the layers of material surrounding it and serves as a bearing for the tubes 18. A rod such as 21 threaded at its outer end and having a nut 22 screwed thereon is riveted at its other end to the supporting grid 15 and serves as a means of adjusting the heating elements 14 to and from the point focus of the elliptical reflector 10. The adjusting nut 22 is made with a portion reduced in diameter and passing through a bushing such as 20 in the end of the elliptical reflector 10 and having riveted on the end where it pro-

jects therethrough a washer such as 23, thus enabling the nut 22 to force the supporting grid 15 and the heating elements mounted thereon in any direction in line with the axis of the rod 21 that it may be desired to. At the upper part of the elliptical reflector 10 there is provided a rectangular opening closed by a lid 44 which is formed from a rectangular frame of thin metal 24 as shown in Figure II, and a pair of plates of transparent material such as 25 which are spaced from each other by a rectangular ring of asbestos board such as 26, thus forming an air cell which quite effectually prevents the loss of heat from the inside of the elliptical reflector 10 therethrough by conduction, yet at the same time permits the user to obtain a clear view of the contents of the electrically heated toaster while it is in operation. A handle 27 is attached to the rectangular metal frame 24 by being fastened by rivets such as 28 to suitable lugs left thereon during the forming process. Another rectangular opening is provided at the lower middle part of the elliptical reflector 10 and is closed by means of a door 29 as shown in Figure I and consisting of a metal stamping 30 of the shape as shown in Figures I and II, having retained therein a layer of insulating material 12 such as magnesium oxide or asbestos by a strip of metal 31, which securely retains the insulating material therein and protects it from mechanical injury and is secured in place by crimping over the edge of the metal stamping 30. The door 29 is supported at its right hand end as shown in Figure I by a pin 32 passing through the lug 33 riveted to the outside of the casing 13 by rivets such as 28 and a pair of ears on the end of the door 29 which are formed during the stamping operation by leaving a pair of long projections in the sides of the door 29 which were not crimped over the metal strip 31. Turning now to Figure II there is shown a toast support 34 pressed out of a sheet of metal in the form of a segment of a circle and of sufficient width that the space between two wire grids such as 35 which are attached to the sides of the toast support 34 by means of small tongues cut from the side thereof and folded over the individual wires of the wire grids 35, as is shown clearly in the enlarged detail in Figure III, is sufficient to permit a slice of toast to be placed between the two wire grids 35. The toast support 34 has its lower edges turned over and is riveted to the door 29 by means of rivets such as 28 as shown in Figure II. The door 29 as shown in Figure I has riveted to its left hand end a handle such as 36 by means of rivets such as 28 and a spring catch 37 which hooks over the edge of the lug 38 on the outside of the pressed metal sheathing 13 and securely holds the door 29 closed. The broken lines indicate the position assumed by the door 29 when it is swung down to give access to the interior of the electric toaster and to remove or insert a piece of toast between the wire grids 35, the electric toaster being supported at a sufficient height above the bed plate 39 by a pair of pressed metal supports 40 secured to the bed plate 39 and the pressed metal sheathing 13 by rivets such as 28 to permit the door 29 to swing down far enough affording ready access to the interior of the electric toaster. In Figure IV we have a source of electrical energy 41 connected in series with a current controlling device 42, four switches such as 43 and the four heating elements such as 14, the heating elements being arranged in pairs at the respective ends of the electric toaster as shown in Figure II and each element of each pair is provided with a switch 43 so that all the elements 14 may be used simultaneously or those located at one end of the electric toaster may only be used or any one heating element may be used as desired. The temperature of the heating elements 14 may be varied at will by adjusting the current controlling device 42.

The operation of the apparatus above described is substantially as follows: The electrically heated toaster having been connected up with the source of energy in the manner as shown in Figure IV by the connections, the article of food which it may be desired to subject to heat therein which in this case is a slice of bread, is inserted between the two wire grids 35, access to which is obtained by the operator grasping the handle 36 on the door 29 and pulling downward thereon causing the spring catch 37 to slip off the lug 38 on the outside of the pressed metal sheating 13 and swinging downward affords ready access to the wire grids 35, the inherent springiness of the material of which they are constructed enables them to securely grip the slice of bread between them and hold it there when the door 29 is in the position as shown by the broken lines in Figure I. The operator now, by raising the end of the door 29 by holding on to the handle 36 closes the door 29 and securely fastens it thereby the spring catch 37 engaging with the lug 38. In order to warm up the electrically heated toaster as quickly as possible the switches 43 shown in Figure IV will be thrown over so that all the heating elements 14 will be in circuit with the source of electrical energy 41 and the current controlling device 42 will be adjusted to pass the maximum amount of current thereto and the desired temperature having been attained in the electrically heated toaster, the temperature of the heating elements 14 as a whole may be reduced by adjusting the current delivered to them by ad-

justing the current controlling device 42. In event of the heat supplied to one side of the article being subjected thereto being too great, one of the heating elements in that end of the electrically heated toaster may be switched off reducing the amount of heat radiated from that end. Further adjustment of the manner in which the heat radiated by the heating elements 14 may be obtained by screwing the nut 22 on or off from the rod 21, thus moving the supporting grid 15 and the heating elements mounted thereon towards or away from the focus of the elliptical reflector 10, the tubes 18 preventing relative rotary movement of the grid 15 and all the mechanism attached thereto with respect to the elliptical reflector 10. The adjustment of the position of the heating elements 14 with reference to the focus of the elliptical reflector 10 permits the control of the heat radiated therefrom so that the slice of bread retained between the wire grids 35 may be subjected to a uniform degree of heat over its entire surface or at one spot in line with the heating elements 14 as may be desired. From the structure of the device as above described it will be seen that all precautions have been taken to insure the retaining of all heat radiated by the heating elements 14 therein, the possibility of loss of heat from the interior of the electrically heated toaster is guarded against by the proper fit of the lid 44 and the opening at the bottom thereof is closed by the door 29. As is well known the properties of an elliptical reflector are such that a beam of radiant heat starting from its focus and striking the reflecting surface will be projected in a direction such that if a similar reflector is opposed thereto as is shown in the electrically heated toaster in Figure II it will be reflected to the focus of the opposing reflector. Those rays of heat which do not impinge upon the reflecting surface of the reflector from the focus of which they are radiated will upon striking the surface of the opposing reflector be reflected therefrom to the focus of the opposing reflector. From the above description of the path of the radiant heat rays in the electrically heated toaster shown in Figure II it will be seen that there is a tendency for the rays which do not expend their energy in raising the temperature of the slice of bread which is interposed between the two foci of the elliptical reflector 10 to be reflected back to the source of heat at the other focus and thereby tend to increase the temperature of the heating elements 14 thus increasing the electrical resistance thereof and correspondingly reducing the quantity of current necessary to keep them at any given temperature. It will thus be seen that upon any object being placed in the above heat-obstructing position the amount of heat reflected from each source to the other source will be materially cut down and that the temperature and heat-radiating effect of each source will be substantially reduced with respect to their temperature before such article is inserted. In this manner there is effected a tendency to automatically limit the amount of heat radiated upon the object introduced as the temperature of each of the heat units cools down. A thin layer of glass 11 protects the surface of the elliptical reflector 10 from tarnishing, oxidizing, fumes and smoke which may be generated in the interior of the electrically heated toaster. The use of the elliptical reflector 10 as above described reduces the amount of heat energy which would naturally be lost by radiation through the pressed metal sheathing 13, the radiation lost is further diminished by the heat insulating material 12 enclosed between the outside surface of the elliptical reflector 10 and the inside surface of the pressed metal sheathing 13.

As various changes might be made in the illustrative apparatus above described and in the art herein set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

We claim:

1. The herein described art which consists in generating radiant heat, enclosing the generating agency to confine by its buoyancy the air thereby heated and introducing an article to be heated upwardly into said confined space into the path of heat radiation.

2. In an electrically-heated bread toaster, in combination, a pair of electrical heating elements each in the form of an elongated exposed metal conductor, a pair of reflectors respectively positioned at the rear of said heating elements and adapted to reflect heat through the same, a movable device adapted to support a slice of bread and move it edgewise into a position between said elements and means enclosing the space between said elements to retain the heated air therein by its buoyancy.

3. In heating apparatus, in combination, a plurality of electrical devices each adapted to radiate heat, a pair of reflectors respectively associated with said devices and at the rear of each of the same, non-metallic means at the surface of each of said reflectors toward the heating device associated therewith, means adapted to support an article to be heated between said devices to be exposed to the heat thereof on both sides, and means adapted to move said supporting means into and out of operative position and means enclosing the space between said reflectors to retain heated air therein by its buoyancy.

4. In heating apparatus, in combination, means adapted to radiate heat at a plurality of points, means adapted to direct a substantial part of the heat rays from one of said points to the other, means enclosing said heat-radiating means and the space therebetween and adapted to retain heated air therein by its buoyancy, and means adapted to introduce an object to be heated upwardly into said space.

5. In an electrically-heated bread toaster, in combination, a casing comprising a pair of walls forming reflectors, a pair of electrical heating elements formed of exposed elongated conductors respectively disposed immediately in front of the reflecting surfaces of said walls, non-metallic means at the reflecting surface of each of said reflectors toward said heating elements through which radiant heat from said elements is reflected to pass through said heating elements, and a movable device adapted to support a piece of bread and move it edgewise into a position between and directly exposed to said heating elements, said casing enclosing the space within which said heating elements and said movable device are positioned.

6. In heating apparatus, in combination, a pair of electrically heated elements, oppositely facing reflecting means in the foci of which said elements are positioned, and means adapted to adjust the position of one of said elements with respect to the corresponding focus.

7. In heating apparatus, in combination, a pair of electrically actuated heat radiating elements, a pair of elliptical reflectors having at their respective foci said elements and adapted to direct rays from each of said elements to the other, means adapted to support an article to be heated between said elements and means adapted to vary at will the intensity of heat to which the article is subjected.

8. In reflecting means, in combination, a metallic reflector, a vitreous coating upon the reflecting surface of said reflector and a source of radiant heat operatively related to said reflector to have the heat rays reflected thereby.

In witness whereof we hereunto subscribe our names.

ROBERT S. BLAIR.
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