

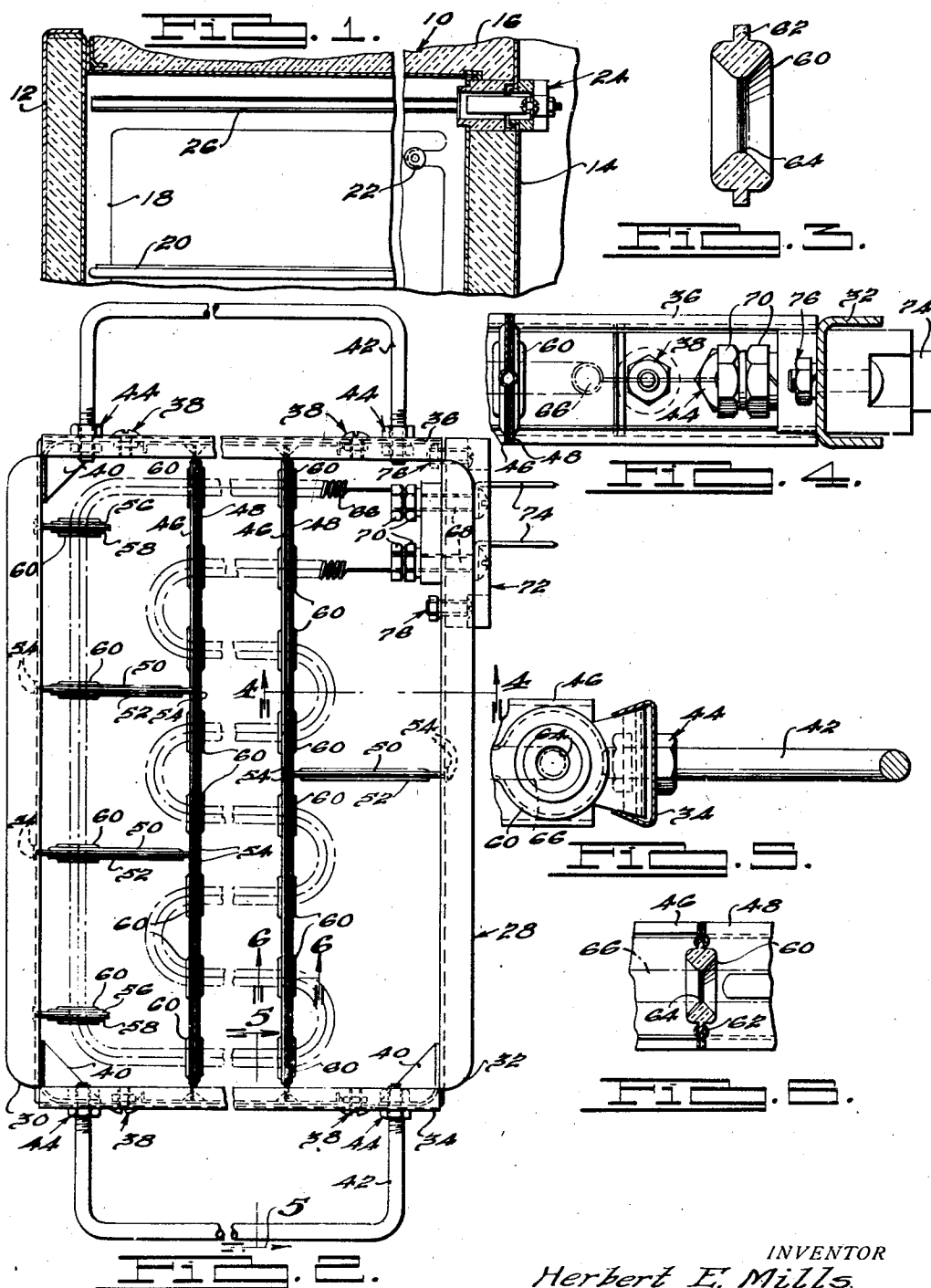
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HEATING UNIT

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HEATING UNIT

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This invention relates to stoves in general and has particular reference to certain elements included in the heating element assembly adapted for use in conjunction with an electric cooking

the latter including means for supporting the heating element within the former and means for insulating the element from the supporting means, the combination offering a novel construction and its elements permitting the realization of high efficiency with low cost together with other appreciable advantages and novel features.

Other objects of the invention will be apparent from a reference to the following specification taken in conjunction with the accompanying drawing of which there is one (1) sheet and in which:

Fig. 1 is a vertical sectional view through a portion of a heating compartment in which the novel structure comprising the invention is adapted to be disposed;

Fig. 2 is a plan view of a heating element and its supporting structure showing the invention embodied therein and being partly broken away;

Fig. 3 is a cross sectional view through the novel form of heat insulator used in the structure disclosed in Fig. 2;

Fig. 4 is a cross sectional view taken along the plane indicated by the line 4—4 of Fig. 2 and showing in detail the various elements comprising the heating element assembly;

Fig. 5 is a cross sectional view taken along a plane as indicated by the line 5—5 of Fig. 2 and showing in detail the assembled relation between the insulator and its supporting means; and

Fig. 6 is a cross sectional view taken along a plane as indicated by the line 6—6 of Fig. 2 and showing the insulator and supporting means therefor in a view at right angles to that of Fig. 5.

Referring to Fig. 1, there is shown, generally at 10, a portion of a heat insulated compartment having a movable closure member 12, a main rear wall 14, and a main top 16. Within compartment 10, and defining one of its inner side walls, is a rack support 18 adapted for supporting a food rack 20. Support 18 is held in place by a plurality of inserts 22 which are supported by and appropriately spaced on the walls of compartment 10. Removably included in the upper portion of the compartment back wall 14 is any well known form of female terminal block assembly, generally indicated at 24, which is adapted for being electrically engaged by the male terminals of the heating element assembly to be used for heating the space within compartment 10. Secured to the upper portion of each side wall of the compartment, and positioned for supporting the heating element assembly and guiding same for operative engagement with the fe-

range.

In any cooking compartment which is heated by electricity it is necessary to provide a heating resistance of some sort, a supporting means for the resistance, and insulating means for separating the former from the latter. The insulating means can take any particular form of construction, but it is best to provide an insulator which interferes as little as possible with the heat emanating from the heating element. The type of insulator disclosed herein is provided with an inner opening through which the heating element passes, and the wall of the opening nearest the heating element is formed in such a way as to provide the smallest area of contact between the insulator and the element, namely, a line contact. The insulator itself is supported at its periphery by the portions of the supporting member for the heating element directly adjacent thereto. The construction of the insulator and the elements used in the combination which includes the insulator is simple and, therefore, inexpensive, and it makes possible the loss of little or no heat from its use and also acts to maintain the natural direction of flow of the heat radiated from the element.

The main object of the invention, therefore, is to provide in the combination of elements which is supported within a cooking compartment for furnishing the cooking heat thereto, an insulating member which is so constructed and so arranged that the loss of heat or any change in the effectiveness thereof, due to the use of such member, is negligible.

Another object is to provide in combination with a supporting member for a heating element, a novel form of insulating member which is adapted for protecting the element from the supporting member and at the same time for causing little or no loss in heat from the element or little or no change in the natural radiational paths of the heat therefrom.

Another object is to provide a novel form of insulator for use in connection with a heating element assembly for a cooking compartment, which provides a minimum area of contact between it and the heating element with which it is associated.

Another object of the invention is to provide a compartment adapted for cooking therein with an improved form of heating element assembly,

male block 24, is a channel iron 26 which extends from the front to the rear of the compartment.

In Fig. 2, there is shown a plan view of the heating element assembly, generally indicated at 28, which is adapted for use in compartment 10 and for being guided and supported by rails 26. The assembly 28 is comprised of an outer shell which is formed by the union between front and rear channel members 30 and 32 and side channel members 34 and 36. Members 30 and 32 have ends which terminate in flanges extending at right angles to said members. These flanges are adapted to engage adjacent portions of members 34 and 36 and are secured thereto by means of a plurality of nut and bolt arrangements, generally indicated at 38. For strengthening this outer shell there is provided at each corner thereof (with the exception of the corner adjacent the male terminal block) a gusset plate 40. One face of each of the plates 40 is welded or otherwise secured to its adjacent channel member 30 or 32, the other face having an opening therein for reception therethrough of one end of a supporting member 42. These supporting members 42 are threaded at each end and are adjustably secured to assembly 28 through channels 34 and 36, the flanges of channels 30 and 32, and plates 40, each by means of a pair of double nut arrangements, generally indicated at 44. Members 42 constitute the portion of assembly 28 which is engageable with and supported by the channeled rail members 26 disposed in compartment 10, and they therefore extend from the outer shell to such a distance as to permit assembly 28 to slide freely in and out of the compartment upon members 26 but, while in, to be firmly supported by members 28.

The inner shell structure of assembly 28 is formed by a series of stampings 46 having flanged end portions extending toward the front of the assembly 28 and seating snugly (but not secured thereto) in the channeled portions of members 34 and 36. Disposed on the flat side of each stamping 46, and secured thereto by pinching and lapping marginal portions of one over the other, is another stamping 48 having flanged ends which extend oppositely to the flanged ends of member 46 and are housed within the channeled portions of members 34 and 36, but are not secured thereto. For strengthening the inner shell of assembly 28 and also for partially supporting the heating element carried by the assembly is a plurality of assembled stampings 50 and 52 which are secured together in a manner similar to that used in joining stampings 46 and 48 together, and between the front shell member 30 and its adjacent stamping unit 46-48, and/or between the rear shell member 32 and its adjacent stamping unit 46-48. These stamping units 50-52 are secured to the outer shell by merely inserting portions of the ends of the unit 50-52 through apertures in the shell and then folding the ends against the shell thereby holding the shell and unit together, as designated at 54. There may also be provided a pair of assembled stamping units 56-58 for supporting the heating element at the corners thereof, and these units 56-58, if provided, are secured to the front member 30 similarly to the units 50-52.

It is to be expressly understood that the arrangement of the inner shell structure is optional, and that the one chosen for the sake of disclosure has proved most efficient for the length of heating element used. It is also to be understood that the construction is optional, and

that the construction chosen to be illustrated is inexpensive, practical, and able to contract and expand freely in accordance with the thermal conditions surrounding it.

Referring to Figs. 2 through 6, there is shown a heat insulator 60 having an outwardly extending marginal portion 62 and a central opening 64. The marginal portion 62 of insulator 60 is adapted to be fitted in an annular pocket formed between the members 46 and 48, members 50 and 52, and members 56 and 58. When so assembled, said members are then pinched closely together for providing means whereby the insulator 60, by its marginal portion 62, is held in position with respect to said members. The central opening 64 in insulator 60 is formed by the intersection of oppositely disposed frustums of cones disposed in each side of the insulator, thus providing the smallest area of opening 64 with a wall having the smallest possible width, namely, a line. This smallest area of opening 64 is made just slightly larger than the diameter of the heating element adapted to be supported therein, the opening, after the assembly of insulator 60 in the aforementioned pocket, being lined up in accordance with openings provided therefor in the stamping members.

Although insulator 60 is shown as being round, it may be any other shape, if so desired, and the area of the opening 64 may also be any shape other than round. The important thing is to provide an opening, the wall of which forms substantially no more than a line contact with the heating element passing therethrough.

For heating the compartment 10 and supported by the assembly 28, is a heating element 66 each end of which is connected to a terminal 68, by means of a pair of holding means 70, of the male terminal block, generally indicated at 72, terminals 68 being electrically associated with the terminals 74 of block 72. Block 72 is secured to assembly 28 by means of nut and bolt arrangements, generally indicated at 76, and is so located with respect to assembly 28 that, when the assembly 28 is inserted in compartment 10 by engaging rod members 42 with guide rails 26, and then pushed rearwardly, the male terminals 74 will engage with the female terminals provided in the block 24.

The heating element 66, after leaving one of the terminals 68, winds in and out of the inner shell structure of assembly 28 by passing through the openings provided therefor in the insulators 60 and, after traversing enough area to provide the desired resistance for the necessary heating effect, returns to the other terminal 68 of the male block 72. In view of the novel construction of the insulator 60 which provides line contact between the insulator and the heating element and also the divergence of the sides of the opening 64 from the inner to the outer surfaces of the opening, the heating effect of the element is not materially diminished by the use of this type of insulator. It has been found that the use of this type of insulator has increased the efficiency of the heating element to such an extent that it is the equivalent of an ordinary heating element having twenty-five or thirty inches more length. The insulator is adapted not only to provide a minimum of interference with or diminution of the heat radiated from the element, but also to prevent any abnormal deflection of this radiated heat. And, the cost of manufacturing this type of insulator is necessarily

lower than the cost of making the accepted insulator of today.

While the invention has been described in some detail, it is to be understood that the description
5 given is for the purpose of illustration only and is not to be construed as definitive of the limits of the inventive idea. The right is reserved to make such changes in the details of construction and arrangement of parts as will fall within the pur-
10 view of the attached claims.

I claim:

1. In a device of the class described, a rectangular supporting frame U-shaped in cross section and open at the top and bottom, insulator
15 supporting elements arranged transversely of the frame and having their end portions received and maintained but not attached within the U-shaped portion of the frame, other insulator supporting members rigidly attached to said frame
20 and the intermediate portion of said first mentioned insulator supporting elements and spacing said first mentioned insulator supporting elements from the ends of said frame, and an electrical resistor element threaded through the in-
25 sulator supporting elements.

2. In a device of the class described, a rectangular supporting frame having side portions formed of channel members, the legs of which
30 converge toward one another, resistor supporting elements extending transversely of the frame and having their ends flared and loosely received

within the converging portions of the side channels, and longitudinally extending supporting elements for spacing said transverse elements one from the front and one from the rear of the frame.

3. In a device of the class described, a rectangular framework open at its top and bottom and composed of channel irons, the legs of the channel irons forming the sides of said framework facing one another and converging toward
10 the center of the framework, and resistor supporting elements arranged transversely of the framework and having flared end portions loosely received within the converging legs of the U-shaped channels along the sides of the frame-
15 work, said supporting elements presenting a relatively negligible horizontal area and being arranged for longitudinal and limited transverse movement relative to said framework.

4. In a device of the class described, a rectangular frame member open at the top and bottom, resistor supporting members having a
20 loose sliding connection with said frame member for support thereby, other resistor supporting elements having a fixed connection to said frame
25 and to the intermediate portions of said first mentioned resistor supporting members for spacing said first mentioned resistor supporting members relative to the ends of said frame.

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