June 4, 1929. H. A. ZIOLA 1,715,690

ELECTRIC RANGE HEATING UNIT

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Fig. 1.

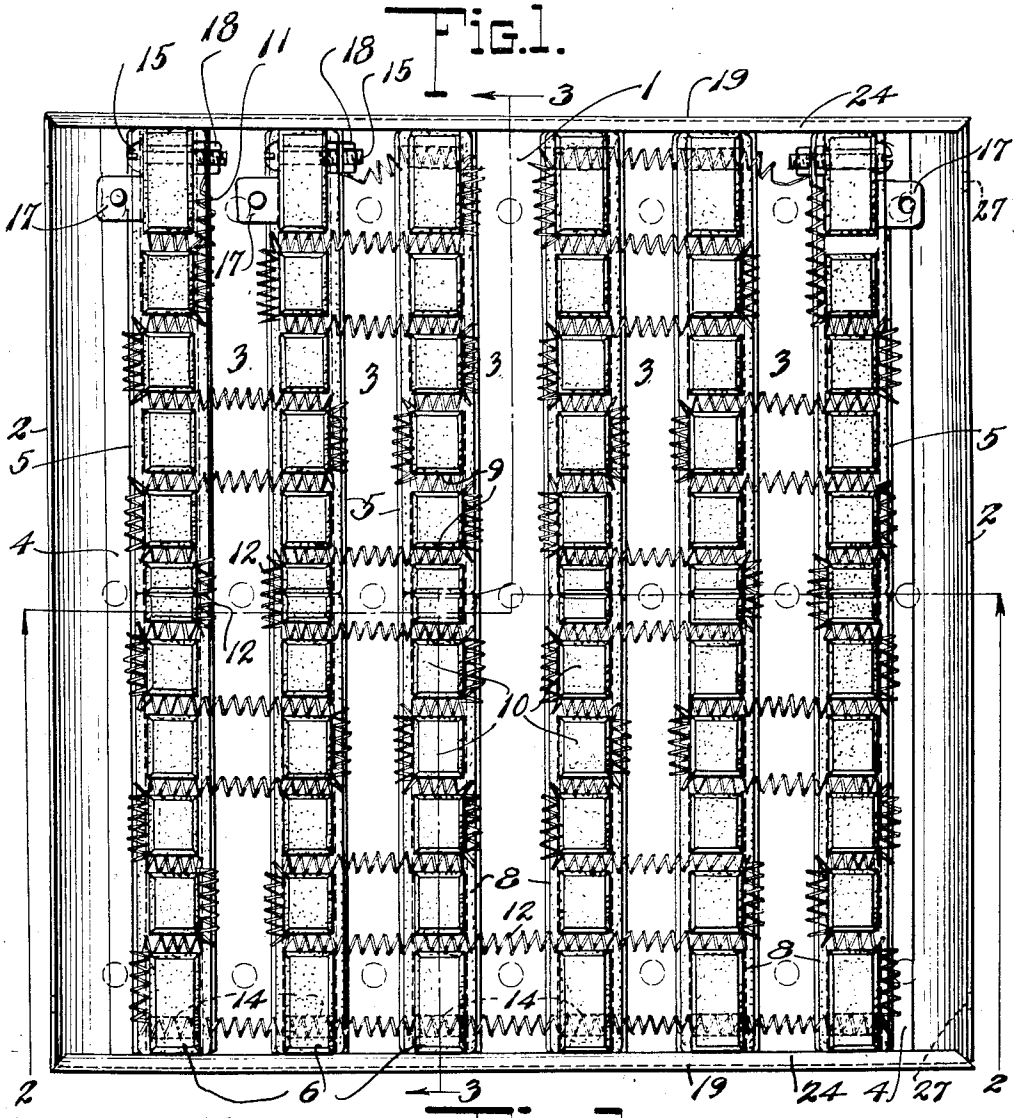
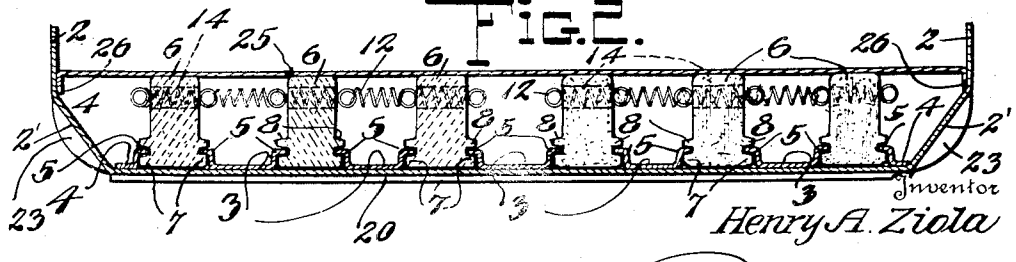


Fig. 2.



Inventor
Henry A. Ziola

By Robb & Robb
Attorneys

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Fig. 3.

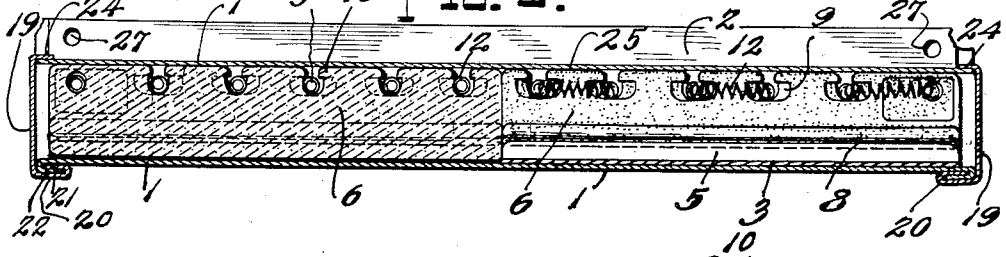


Fig. 4.

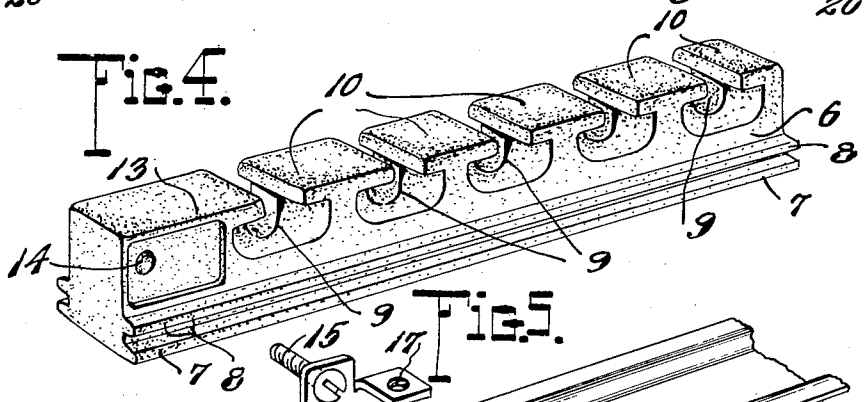


Fig. 5.

Fig. 6.

Fig. 7.

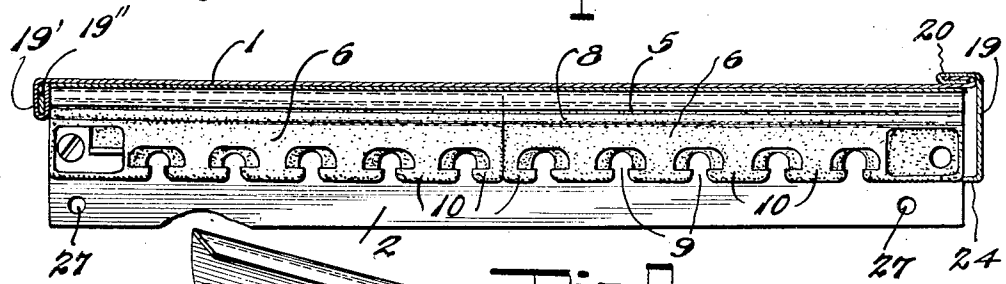
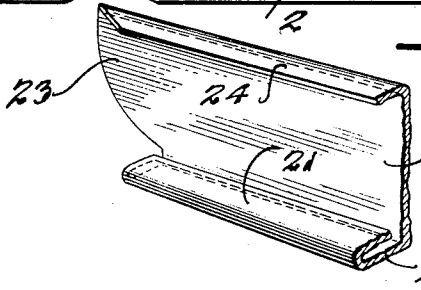


Fig. 8.



Inventor
Henry A. Ziola
By Robb & Robb
Attorneys

Patented June 4, 1929. 1,715,690

UNITED STATES PATENT OFFICE.

HENRY A. ZIOLA, OF TOLEDO, OHIO, ASSIGNOR TO THE SWARTZBAUGH MANUFACTURING COMPANY, OF TOLEDO, OHIO, A CORPORATION.

ELECTRIC-RANGE HEATING UNIT.

Application filed March 11, 1927. Serial No. 174,567.

This invention relates to improvements in electric heaters of the type especially well adapted for use in cooking foods and the like, and has as its primary object the adaptation of a heater construction such as to produce a unit lending itself efficaciously to use in a cooking oven or other part of a range or electrical furnace.

Other objects will in part hereinafter become apparent and in part be stated, in the attaining of which, an embodiment of the invention comprises a supporting or carrier plate, refractory insulators detachably sustained thereby, an electrical resistance carried by said insulators, and detachable means for retaining the insulators in their engaging positions.

The invention also comprises certain other novel constructions, combinations and arrangements of parts as will hereinafter be specified and claimed.

In the accompanying drawings:

Fig. 1 is a plan view of an electrical heater embodying the features of the present invention, the cover plate being omitted.

Fig. 2 is a transverse section taken on the planes indicated by the line 2—2 of Fig. 1 and looking in the direction of the arrows.

Fig. 3 is a longitudinal section taken on the planes indicated by the line 3—3 of Figure 1, parts being seen in elevation.

Figs. 4, 5 and 6 are detailed, detached, perspective views of one of the insulator sections, one of the binding posts, and one of the groove-forming flanged parts, respectively.

Fig. 7 is a longitudinal section through a modified embodiment, parts being seen in elevation.

Fig. 8 is a sectional perspective of one of the detachable end plates detached.

The structures illustrated in the accompanying drawings are especially shaped and designed for application to a particular oven which is made the subject matter of claim in my copending application filed even date herewith, but it is to be understood that the invention is not limited to such specific adaptation.

Referring to the drawings by numerals, 1 indicates a main backing or supporting plate, which has its longitudinal marginal portions bent up to form side flanges 2, 2, adapted to be anchored to engage parts of an oven as set forth in said copending application. Fixed to the upper or exposed face of the plate 1 are plates 3, 3, arranged parallel to each other and spaced equi-distance apart, each being spot welded or otherwise effectively anchored to the plate 1. Near each side, and extending along the plate 1, is a plate 4, spaced from the next adjacent plate 3 similarly to the spacing of the plates 3 from each other. Each plate 3 is provided with a pair of over-hanging flanges 5, and each plate 4 is provided with one overhanging flange 5, the flanges 5 of the plate 4 facing the next adjacent plate 3, and flanges 5 of the plates 3 facing in opposite directions so as to face an opposing similar flange. Since the flanges 5 are constructed to overhang the space between the plates, the said space becomes in effect an under-cut groove, and insulators 6, 6, having under-hanging or dove-tailed bases 7, 7, are slidingly fitted into said grooves, the bases 7 being of greater width than the body of the insulator 6 so as to under-lie the overhanging portions of the flanges 5. Thus the insulators 6 are effectively anchored to the plate or base 1. Each insulator 6 is preferably provided at each side with an outstanding, overhanging flange 8 lapping the terminal portions of the respective overhanging flanges 5, so that a longitudinal groove is formed between the outstanding portions of the base 7 and each of the flanges 8, which groove is occupied by the overhanging portion of the respective flange 5. Each insulator 6 may be of any desired length relative to the length of the base or plate 1, but, preferably for a heater intended for oven use, I employ insulators 6 equal in length to approximately half the length of the base or plate 1, so that two aligned insulators 6 extend from one end of plate 1 to the other.

Spaced from plate 1 and flanges 5, each insulator is formed with outwardly opening notches 9, 9, which are preferably slightly undercut, as seen in Fig. 3, forming a row of overhanging heads 10, 10 at the free edge of insulator 6 with neck portions connecting to the main body of insulator 6 between the notches 9. A heat producing resistance 11 is laced through the undercut apertures 9 and back and forth beneath the heads 10, as best seen in Fig. 1, the lacing in some instances being confined to the single insulator block 6, and in other instances extending

across laterally to the next independent block, and in still other instances longitudinally to the next contacting block. It is to be noted that the aperture 9, as best seen in Fig. 4, nearest the inner end of an insulator 6, that is the end intended to butt against another similar insulator, is spaced from the terminus of the insulator 6 a distance approximately one-half the distance between any two other apertures 9. Thus when two insulators are brought into endwise contact when assembled, as shown in Fig. 1, the abutting terminals are adapted to be treated as a common unit, the two together providing a head similar to head 10, about the neck of which is passed the loop 12 of resistance 11, whereby the sections are adapted to be held against endwise separation during assemblage and before the end plates or guards (hereinafter described) have been applied. One end of one of the insulators 6, of each set of such insulators, is provided with a substantial portion 13 uninterrupted by aperture 9, but formed with a perforation 14, adapted to receive a pin or bolt 15 securing the contact making plate 16 which is adapted to receive the terminal of an electric current lead. The bolt 15 is designed to be passed through the aperture 14 to the other side of the block and there be engaged by a retaining and clamping nut 18. An electrical lead is adapted to be clamped by a bolt against the contact plate or binding post tab 17 of the plate 16. As many of the contact posts thus constructed may be utilized as desired, and, in each instance, the resistance 11 has a terminal passed about the bolt 15 and firmly clamped into effective contact by being engaged by the nut 18. When more than two such binding posts are employed, one is connected with each terminal of the resistance 11, which is or may be a continuous unit, and the other binding post or binding posts, is or are engaged by an intermediate part or parts of the resistance to enable current to be supplied to various areas of the resistance 11, or to all of it, as occasion may require.

While the lacing of the resistance 11 tends to retain the insulators 6 in their proper relative relation, and while the insulators may fit within the flanges 5 sufficiently tightly to remain under ordinary conditions in proper place, it is desirable to effectively insure against longitudinal movement of such insulators, and, of course, it is desirable to cover the insulators against access of foreign substances. To this end, each terminal of the base or plate 1 is engaged by a transversely slidably mounted end closing plate 19. As best seen in Figs. 3 and 8 each plate 19 is provided with a marginal, longitudinal flange 20 under-hanging the base 1 and having a return lap 21 slidingly interlocked with a longitudinal return lap 22 of the respective end portion of the plate or base 1. Each plate 19 preferably terminates at each end in a curve 23, especially when the heater is to be applied to the improved oven above referred to, to adapt the heater to the contour of the oven. Each plate 19 is adapted to be slid longitudinally into and out of the interlocking engagement with the flange 22, and each plate 19 is provided, at its upper edge, with a marginal over-hanging flange 24 extending toward the ends of the insulator 6.

Under some conditions, such, for example, as when the heating unit is to be employed in the top of an oven facing downward, it may be desirable to leave the heat producing resistances and their insulators exposed, but when the heater unit is to be at the bottom of the oven, or otherwise located where injurious substances might and would be liable to reach the resistances, a cover plate is preferably employed, such, for instance, as the plate 25 proportioned to extend from one flange 2 to the opposite flange 2, and from one plate 19 to the opposite plate 19. When plate 25 is employed, its margins are preferably arranged beneath the over-hanging flanges 24 of the plate 19. Also the side margins of plate 25 are preferably bent downward to form stiffening flanges 26, arranged in face contact with the respective flange 2. To avoid a projecting edge at each side of the heating unit, each flange 2, instead of upstanding directly from the plate 3, may be formed with an inclined area 2′ extending from the main body of the plate 3 to the respective upstanding flange 2. Each of the upstanding portions of flanges 2 beyond the horizontal plane of the base portion of the heater unit is provided, as seen in Fig. 3, with apertures 27, 27, for receiving anchoring means to connect the heater unit to the oven or other structure, in conjunction with which it is intended to be operated.

In Fig. 7 is illustrated a slightly modified embodiment of the structure in which the parts are identical with those above described, except for a substitute at the left hand end of the figure for the respective plate 19. The resistance wires 12 and cover plate 25 have been omitted from the figure and the same reference numerals, as employed above, have been applied and the same description will apply. The structure shown in Fig. 7 is especially adapted for use where the unit is protected against injury from extraneous matter, and the cover plate 25 may not be applied at all. The resistance wires, of course, will be required. The modification in this figure consists in the omission of the terminal plate 19 at the left hand end of the structure, as seen in Fig. 7, and the substitution therefor of a right angle flange 19′ formed from the end

margin of the base plate 1. The flange 19′ may be formed with a return loop, as seen in Fig. 7, and a stiffening strip 19″ is preferably interposed between the return flange and the main flange 19, so as to provide a good, strong, stiff bar against which the ends of the insulators 6 abut. The bar thus produced is, of course, a permanent part of the base 1 and cannot be removed. Removal of the insulator 6 in this embodiment is effected by removal of the plate 19 at the right and the sliding of the insulator 6 out longitudinally in that direction. The insulator 6, in the structure seen in Fig. 1, may be slid out longitudinally in either direction by the removal of both plates 19, whereby one insulator 6 of a pair may be removed without removing the other, whereas in the structure seen in Fig. 7, if the inner insulator of the pair requires displacement, both must be removed.

The interlacing of the resistance wires 11, through and about notches 19 and the insulating material therebetween, is susceptible of almost limitless variation. It is, of course, necessary to follow such method of lacing as will most effectively and uniformly distribute heat to be generated. The operation, of course, will be well understood by those skilled in the art. When the full capacity of the heater is desired, the circuit is closed between the binding post tab 17 of the extreme limits of the resistance 11, and when less than the full capacity is desired, the difference in potential is maintained between one of the terminal binding post tabs 17 and intermediate tab 17′.

Access to the parts is especially available and easy. The plates 19 may be slid longitudinally out of place whenever the heater is not encased or otherwise confined in a manner to prevent such movement, and as soon as the plates 19 are removed, the bolts 15 may be readily detached, the resistance 11 removed, and any section or sections of insulators 6 may be slid out of engagement with the flanges 5 and all parts thereby readily approached for repair or removal.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In electrical heating apparatus, the combination of a support and resistance insulating bars engaging and outstanding from said support and having a detachable interlocked connection therewith, each of said bars having a series of undercut, transverse slots leaving a series of overhanging heads.

2. In electrical heating apparatus, the combination of a support and resistance insulating bars engaging and outstanding from said support, each of said bars having a series of undercut transverse slots leaving a series of overhanging heads, and a resistance laced through said slots both laterally between different insulators and longitudinally of a given insulator.

3. In electrical heating apparatus, the combination, with a support, of insulator bars detachably engaging the support and arranged in tandem pairs, each bar being formed with undercut slots leaving overhanging heads, and a heat producing resistance interlaced through said slots and connecting adjacent ends of a pair of the insulator blocks.

4. In electrical heating apparatus, the combination of a base plate, flange members outstanding from the base plate and providing undercut grooves, dove-tailed, insulating blocks slidingly interlocking said groove, and a cross plate detachably and slidably engaging the base plate in position to intercept sliding movement of the insulating blocks.

5. In electrical heating apparatus, the combination of a base plate, flange members outstanding from the base plate and providing undercut grooves, dove-tailed, insulating blocks slidingly interlocking said groove, and a plate at each end of the insulator blocks extending transversely thereof in position for intercepting sliding movement of the blocks, one of said plates being detachably and slidingly connected to the base plate to slide transversely out of engagement therewith, the base plate and said sliding plate having interlocking, slidingly connecting flanges.

6. In electrical heating apparatus, the combination of a base plate, flange members outstanding from the base plate and providing undercut grooves, dove-tailed, insulating blocks slidingly interlocking said groove, and a plate at each end of the insulator blocks extending transversely thereof in position for intercepting sliding movement of the blocks, one of said plates being detachably and slidingly connected to the base plate to slide transversely out of engagement therewith, the base plate and said sliding plate having interlocking, slidingly connecting flanges, and said sliding plate having a flange at its edge opposite its engagement with the base plate, and a cover plate for the insulators extending beneath and retained by the last named flange.

7. In electrical heating apparatus, the combination of a base plate having marginal flanges extending along the sides, insulators carried by said base plate, a heat resistance carried by the insulators, and a cover plate for the insulators contacting with the side flanges and being held thereby against edgewise play.

8. In electrical heating apparatus, the combination of a base plate having marginal flanges extending along the sides, insulators carried by said base plate, a heat resistance

carried by the insulators, and a cover plate for the insulators contacting with the side flanges and being held thereby against play, and means for retaining the cover plate against longitudinal play.

9. In electrical heating apparatus, the combination of a base plate having marginal flanges extending along the sides, insulators carried by said base plate, a heat resistance carried by the insulators, a cover plate for the insulators contacting with the said flanges and being held thereby against edgewise play, and plates extending across the ends of the base plate and disposed to retain the cover plate against longitudinal play.

10. In electrical heating apparatus, the combination of a base plate having marginal flanges extending along the sides, insulators carried by said base plate, a heat resistance carried by the insulators, a cover plate for the insulators contacting with the side flanges and being held thereby against edgewise play, and plates extending across the ends of the base plate and disposed to retain the cover plate against longitudinal play, one of said end plates being detachably connected to the base plate.

In testimony whereof I affix my signature.

HENRY A. ZIOLA.