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UTENSIL SUPPORT FOR DOMESTIC APPLIANCE

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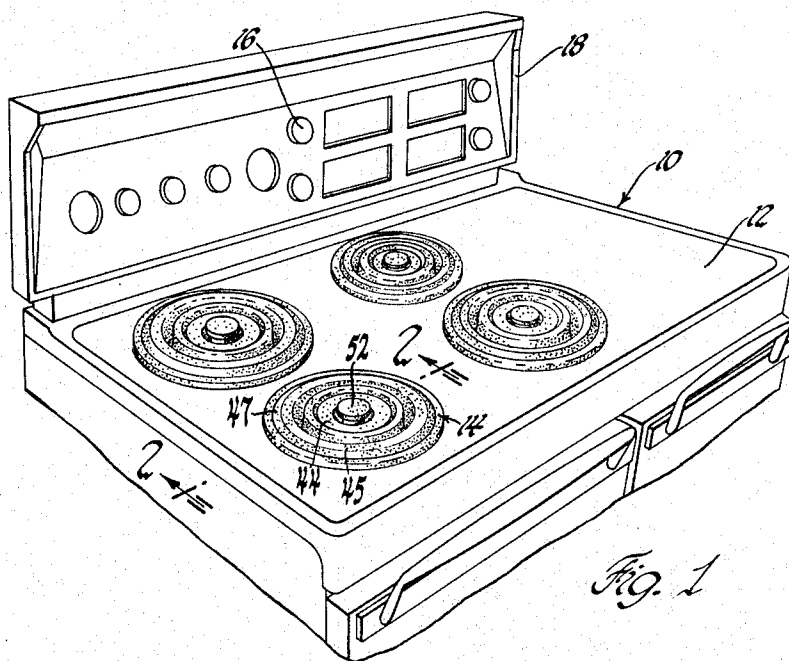


Fig. 1

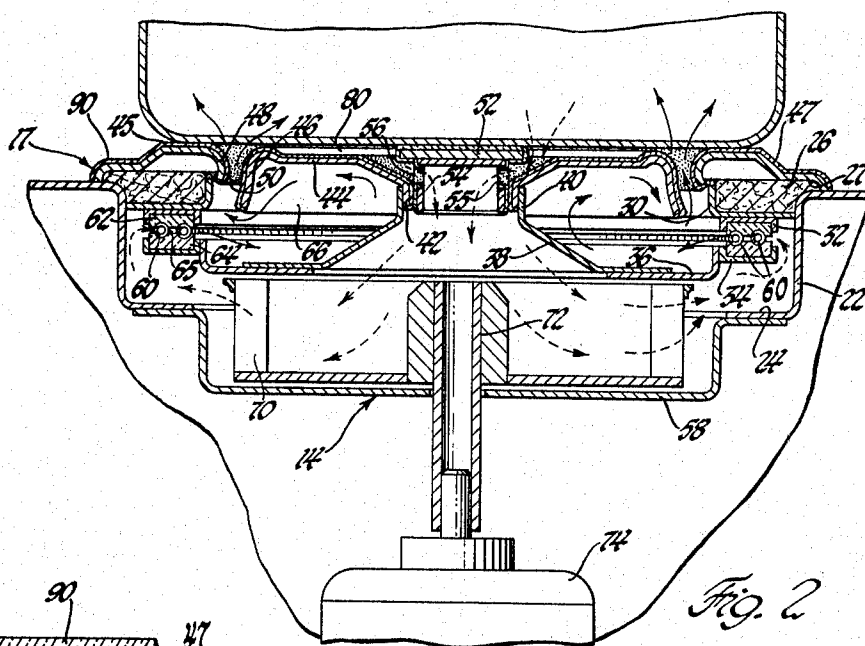


Fig. 2

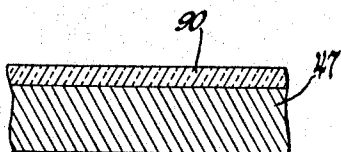


Fig. 3

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**UTENSIL SUPPORT FOR DOMESTIC APPLIANCE**  
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This invention relates to a domestic appliance, and more particularly to a surface cooking unit for a household range in which the burner is located in a remote position from the heat source and is provided with a colored ceramic coating capable of withstanding the high temperatures and thermal cycling conditions of such ranges.

Household electric ranges commonly employ a coiled resistance heating unit located on the top surface of the range. Such heating units are relatively unattractive and detract from the overall range design because of their open coiled structures. In addition, their gunmetal grey color stands out against the background of lustrous white or pastel colored enamels currently used on ranges. Aside from the unattractiveness, conventional resistance heating units are difficult to clean when foods are spilled or burned on them.

Furthermore, and as pointed out in the United States application entitled "Domestic Appliance," Serial No. 97,572, filed March 22, 1961, and now Patent No. 3,167,638, the design and efficiency of such units has remained comparatively stable in recent years though certain chronic engineering deficiencies inherent with this type of a unit still prevail. In that patent application, a new air convection type of range burner is disclosed in which the burner is spaced from the heat source and the cooking utensil is heated by moving air currents while the burner is kept relatively cool. This has eliminated many disadvantages common to resistance heating units. For example, one problem with coiled resistance units is that they are in direct contact with the bottom of the cooking utensil or pan and depend on radiation or conduction for heating which requires a high burner temperature. The range burner of the above application operates at a relatively low temperature thus permitting the use of high temperature ceramic coatings on the cooking surface. The novel coatings of this invention are made in a variety of pastel colors complementing the conventional vitreous enamels and paints used with present day household ranges and are especially suited for range burner application where resistance to scratching and retention of a hard, lustrous surface finish at cooking temperatures is essential.

In accordance with this invention, a properly prepared metallic burner base is sprayed with an aqueous ceramic coating composition on the cooking surface thereof. The composition has a ceramic frit base as its major ingredient which is composed predominantly of the oxides of barium, boron, and silicon. The frit is pulverized and prepared as a wet slip with batch additions of selected colorants to produce the desired coating color. When fired, the coating renders a glossy, enamel-like finish in hues and pastel shades masking the metallic base and complementing the enamel finishes of the range.

A more complete understanding of the invention may be had by referring to the following description and drawings wherein:

FIGURE 1 is a fragmentary perspective view of an electric range assumed for use with this invention;

FIGURE 2 is a fragmentary sectional view taken through line 2—2 of FIGURE 1 showing an air convection cooking unit with a ceramic coated range burner supporting a cooking utensil; and

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FIGURE 3 is an enlarged sectional view of the range burner showing the metallic base with the inventive coating bonded thereto.

Referring to FIGURE 1, the range 10 has a range top 12 supporting a plurality of air convection cooking units 14 on one side thereof. Suitable controls such as 16 are provided on a console 18 and are adapted for selectively energizing the units 14.

As disclosed in the above mentioned application, these units operate by circulation of heated air against the bottom of the cooking utensil. The supply of heat to the utensil is continuous through the action of air currents heated by a remotely located electric heating unit and recirculated by a blower. This new heat transfer idea with respect to household ranges has produced a more efficient cooking unit operating at temperatures somewhere in the neighborhood of 1100° F.

Referring to FIGURE 2, a sectional view through one of the novel air cooking units 14 is shown. An upper three-piece burner 17 substantially closes the opening in the range top and hides the duct work, heater element, and blower apparatus supported below. The range top is formed with a cylindrical depending collar 22 which terminates in a horizontal shoulder 24. An insulation ring 26 has an annular shoulder 27 carried by the range top at the edge of the depending collar 22 and is provided to limit heat transfer in this area. An upper heater support ring 30 is attached to the undersurface of the insulation ring 26 and carries a heater support bracket 32. Disposed in opposed relationship to the upper support bracket 32 is a lower support bracket 34 fixed relative to the range top in a suitable fashion. An annular duct flange 36 is connected to the support bracket 34 and supports a generally conical return duct 38. The return duct 38 has an upwardly extending collar 40 which receives in nested relationship a downturned collar 42 of the intermediate burner ring 44.

It should be noted that the intermediate burner ring 44 is spaced below the pan supporting surface 45 of the outer burner ring 47. Burner ring 44 terminates in a downwardly extending collar 46 in spacial relationship to a downwardly curved portion 48 of the outer ring 47 thereby forming an annular hot air supply outlet 50. A burner baffle plate 52 is provided with a depending sleeve 54 having perforations 55 therein. The sleeve 54 is adapted to frictionally engage the collar 42 of the intermediate burner ring 44 to space the perforations 55 and the plate 52 from the ring 44 to form therewith air return inlet openings 56.

The air flow passages are completed by fan housing 58 which is fastened in air-tight relationship to the shoulder 24 of the range top 12. A pair of resistance coils 60 are held in a ceramic sandwich formed of an upper annular ring 62 and a lower ring 64 supported in the brackets 32 and 34. A heating passage or chamber 65 is formed between the ceramic rings which cradle the bare convolutions of the resistance coils in a location generally beneath the outer burner ring 47 and below the insulation ring 26. The heating passage 65 is provided with ample clearance for air flow over and around the resistance coils 60.

An impeller 70 is disposed within the fan housing 58 and is connected to a shaft 72 journaled in a suitable manner in fan housing 58. A motor 74 sized to drive the impeller and suitable for installation in the range 10 may be used and concealed beneath the range top.

Conventional resistance heating surface units have a tendency to overheat when unloaded, i.e., when the pan is removed. This occurs from the fact that the air surrounding the unit is static and resists heat dissipation. Furthermore, since such units heat by the principle of radiation and conduction they are in direct contact with

the cooking utensil and accordingly must reach a very high temperature to do any cooking. This principle of heating requires a surface temperature in the order of 1550° F.

The new air-cooking unit employs a different heating principle. In operation, with a cooking utensil in place as shown in FIGURE 2, an air passage 80 will be formed between the bottom of the pan and the intermediate burner ring 44. Thus air is forced by the impeller 70 through the coils 60 in passage 65 and into an annular supply duct 66 below the ring 44. The heated air is then drawn through the outlet duct 50 into the temporary air passage 80 traveling radially inwardly beneath the pan and returning through the openings 56. The air will be recirculated so long as the pan is in place and the heating coils 60 are energized and the impeller is operated. The recirculation of the same air prevents heat loss to the atmosphere and allows the cooking temperature to be reached rapidly.

When the pan is removed from the burner, air recirculation ceases and is instead exhausted through the outlet 50. This is a very desirable feature since it prevents overheating when no pan is present on the burner and corrects one of the major problems of the resistance heating unit, that is, no load overheating.

The operational temperature of the burner 17 is in the range of 1100° F. which has been made possible by using the principle of convection heat flow rather than radiation-conduction of the more conventional resistance heating units which operate at temperatures of about 1550° F. This reduction in burner heat, while at the same time achieving the necessary cooking temperature, has opened the door for the use of a high temperature, thermal shock resistant ceramic coating. Coating 90 shown on the exposed surfaces of the burner rings 44, 47 and on the plate 52 is especially suited for range burner application.

Present day kitchen ranges come in a wide variety of colors ranging from white to various pastel shades greatly expanding color selections and providing greater flexibility in the planning of kitchen decors which is an important sales factor in the household appliance field. An even more attractive and neat-appearing range is possible where colored burners matching or complementing the range color may be used.

Present day colored porcelain enamels, though possessing a lustrous and smooth surface finish in the fired condition, soften at too low a temperature to be used as a coating material for range burners. Conversely, available high temperature ceramic coatings firing at 1700° to 2100° F., which would be expected to have the required thermal shock resistance, have been found to be too coarse and display undesirable colors in the fired condition which precludes their usefulness in the present invention.

Accordingly, we have developed a range burner coating which masks the metallic base of the burner and is capable of being colored to complement most available range colors. The coating has proved attractive and lustrous in appearance throughout the specified range operating temperatures and in thermal shock bench tests and has proved easy to clean with the conventional household abrasive cleaners. In addition, it has given no evidence of softening below 1200° F. and has proved resistive to abrasions from cooking utensils.

Referring again to the drawings, in FIGURE 3 it may be seen that the coating 90 is bonded to the metallic burner base as a continuous vitreous phase. Each burner element 44 and 47 has been previously shaped to improve air flow and to provide surfaces which facilitate even coating application as outlined below.

*Preparation of the burner base.*—Proper preparation of the metallic burner base is necessary to obtain adherent coatings free of defects. It is important that the burner parts be stress relieved and have a roughened sur-

face free of foreign matter prior to coating. The procedure followed involves heat treating the burner elements in air at 1450° F. for two hours to anneal, vapor blasting with grit silica particles, repressing if necessary, and cleaning. Prior to coating the burner elements may be heat treated at 1800° F. for one hour in air, vapor blasted again, washed with detergent, rinsed in tap water followed by a boiling water rinse, and oven dried. Instead of vapor blasting to produce a roughened surface, a suitable chemical etchant may be used. The prepared burner elements are then spray coated on the cooking surface and fired.

*Coating application and firing.*—The coating is prepared as an aqueous slip (see Table II) and is applied to the properly prepared metal burner elements uniformly by spraying at a fluid pressure of 12 to 15 p.s.i. and at an atomizing pressure of 60 p.s.i. using a spray gun with a nozzle adapted to handle the relatively heavy slurry. A wet-type spray application is employed so that a fired thickness of about 2.5 to 6.2 mils results depending on the color to be produced. Coating compositions containing an opacifier (light colors) are generally fired in air at 1750° F. for five minutes, while the compositions without an opacifier (dark colors) are superior when fired at around 1700° F. for five minutes.

*Coating compositions.*—The coatings are basically composed of ceramic frits which are essentially barium borosilicates with minor additions of the oxides of the alkaline and alkaline earth metals along with the oxides of bismuth, aluminum, antimony, titanium, zirconium and cerium. As an example, the following table lists the proximate weight percent analysis of two frits which have been mixed to produce satisfactory coatings.

TABLE I.—FRIT COMPOSITIONS

| Oxide                          | Frit #A | Frit #B |
|--------------------------------|---------|---------|
| Li <sub>2</sub> O              | 0.76    |         |
| Na <sub>2</sub> O              | 2.99    |         |
| K <sub>2</sub> O               | 1.35    |         |
| CaO                            | 0.42    | 5.05    |
| ZnO                            | 1.16    | 5.04    |
| BaO                            | 18.20   | 24.50   |
| MgO                            | 0.66    |         |
| SrO                            | 0.28    |         |
| Al <sub>2</sub> O <sub>3</sub> | 1.23    |         |
| B <sub>2</sub> O <sub>3</sub>  | 8.53    | 8.11    |
| Bi <sub>2</sub> O <sub>3</sub> |         | 9.86    |
| SiO <sub>2</sub>               | 49.30   | 37.43   |
| TiO <sub>2</sub>               | 8.75    | 5.04    |
| CeO <sub>2</sub>               | 1.50    | 5.04    |
| ZrO <sub>2</sub>               | 4.10    |         |
| Total                          | 99.23   | 100.07  |

When certain light pastel colors are to be produced an opacifier must be added to the frit mixture to provide sufficient covering power to mask the metallic color of the burner. Various available colorants or pigments in the form of metallic oxides may be added in proportions to provide the exact hue or shade of coloration desired. Other batch ingredients include ordinary enamels clay, water, and a suitable flocculent to prevent the coating from running when sprayed on the burner elements.

The ingredients are comminuted in a standard pebble or ball mill to pass a 325 mesh screen and are prepared in an aqueous slip according to the example batch formulation shown in Table II:

TABLE II

| Batch ingredients:                                                                            | Composition range, parts by weight |
|-----------------------------------------------------------------------------------------------|------------------------------------|
| Frit A                                                                                        | 62.5-81.5                          |
| Frit B                                                                                        | 18.5-37.5                          |
| Clay                                                                                          | 6-8                                |
| Opacifier (used only with turquoise and yellow colors as well as other lighter pastel shades) | 10-20                              |
| Colorant (the amount depends on color)                                                        | 1.5-4.25                           |
| Flocculent                                                                                    | 0.063                              |
| Water, cc.                                                                                    | 48-53                              |

After the slip is prepared, it is sprayed on the burner element and fired in the manner previously described producing a metallic-glass structural material as shown in FIGURE 3. The fired coating will generally be about 5 mils thick for those coatings containing the opacifier while the darker colors without the opacifier will generally be about 3 mils thick. A thickness in excess of about 6.2 mils leads to a less satisfactory appearance and is likely to spall off or crack when subjected to thermal stresses. The proportions of frit A and frit B may be varied to produce an as fired composition as indicated by the proximate analysis of four dark color coatings in Example I where a 7% clay batch was prepared using various indicated proportions of frit A and frit B without an opacifier. In Example II, four light color coatings which required an opacifier were analysed.

Example I.—Frit base A and B, 7% clay

| Ingredient                     | 20% Frit A<br>80% Frit B | 62.5% Frit A<br>37.5% Frit B | 75% Frit A<br>25% Frit B | 81.5% Frit A<br>18.5% Frit B | Composition<br>Range |
|--------------------------------|--------------------------|------------------------------|--------------------------|------------------------------|----------------------|
| Li <sub>2</sub> O              | 0.14                     | 0.45                         | 0.54                     | 0.59                         | 0.14-0.59            |
| Na <sub>2</sub> O              | 0.56                     | 1.77                         | 2.12                     | 2.31                         | 0.56-2.31            |
| K <sub>2</sub> O               | 0.25                     | 0.79                         | 0.96                     | 1.04                         | 0.25-1.04            |
| BaO                            | 21.90                    | 19.40                        | 18.75                    | 18.30                        | 18.30-21.90          |
| CaO                            | 3.88                     | 2.03                         | 1.50                     | 1.21                         | 1.21-3.88            |
| MgO                            | 0.12                     | 0.39                         | 0.46                     | 0.51                         | 0.12-0.51            |
| SrO                            | 0.06                     | 0.16                         | 0.20                     | 0.22                         | 0.06-0.22            |
| ZnO                            | 4.01                     | 2.47                         | 2.02                     | 1.78                         | 1.78-4.01            |
| B <sub>2</sub> O <sub>3</sub>  | 7.72                     | 7.94                         | 7.98                     | 8.00                         | 7.72-8.00            |
| Al <sub>2</sub> O <sub>3</sub> | 2.83                     | 3.34                         | 3.50                     | 3.56                         | 2.83-3.56            |
| Bi <sub>2</sub> O <sub>3</sub> | 7.43                     | 3.50                         | 2.33                     | 1.72                         | 1.72-7.43            |
| SiO <sub>2</sub>               | 40.90                    | 45.60                        | 47.00                    | 47.90                        | 40.90-47.90          |
| TiO <sub>2</sub>               | 5.44                     | 6.96                         | 7.41                     | 7.64                         | 5.44-7.64            |
| ZrO <sub>2</sub>               | 0.77                     | 2.42                         | 2.92                     | 3.16                         | 0.77-3.16            |
| CeO <sub>2</sub>               | 4.07                     | 2.68                         | 2.26                     | 2.04                         | 2.04-4.07            |
| Total                          | 100.08                   | 99.90                        | 99.95                    | 99.98                        |                      |

The composition range for pastel coatings which required 10% opacifier and 7% clay is shown in Example II.

Example II.—Frit base A and B, 7% clay

[10% opacifier (uverite)]

| Ingredient                     | 20% Frit A<br>80% Frit B | 62.5% Frit A<br>37.5% Frit B | 75% Frit A<br>25% Frit B | 81.5% Frit A<br>18.5% Frit B | Composition<br>Range |
|--------------------------------|--------------------------|------------------------------|--------------------------|------------------------------|----------------------|
| Li <sub>2</sub> O              | 0.13                     | 0.41                         | 0.49                     | 0.53                         | 0.13-0.53            |
| Na <sub>2</sub> O              | 0.52                     | 1.62                         | 1.94                     | 2.10                         | 0.52-2.10            |
| K <sub>2</sub> O               | 0.23                     | 0.72                         | 0.87                     | 0.94                         | 0.23-0.94            |
| BaO                            | 20.00                    | 17.70                        | 17.10                    | 16.80                        | 16.80-20.00          |
| CaO                            | 5.87                     | 4.28                         | 3.80                     | 3.56                         | 3.56-5.87            |
| MgO                            | 0.11                     | 0.35                         | 0.42                     | 0.45                         | 0.11-0.45            |
| SrO                            | 0.05                     | 0.15                         | 0.18                     | 0.20                         | 0.05-0.20            |
| ZnO                            | 3.66                     | 2.26                         | 1.84                     | 1.63                         | 1.63-3.66            |
| B <sub>2</sub> O <sub>3</sub>  | 7.05                     | 7.27                         | 7.29                     | 7.30                         | 7.05-7.30            |
| Al <sub>2</sub> O <sub>3</sub> | 2.59                     | 3.06                         | 3.19                     | 3.25                         | 2.59-3.25            |
| Bi <sub>2</sub> O <sub>3</sub> | 6.79                     | 3.20                         | 2.13                     | 1.60                         | 1.60-6.79            |
| Sb <sub>2</sub> O <sub>3</sub> | 3.49                     | 3.51                         | 3.52                     | 3.53                         | 3.49-3.53            |
| SiO <sub>2</sub>               | 36.40                    | 41.60                        | 42.90                    | 43.55                        | 36.40-43.55          |
| TiO <sub>2</sub>               | 7.55                     | 8.95                         | 9.36                     | 9.56                         | 7.55-9.56            |
| ZrO <sub>2</sub>               | 0.71                     | 2.21                         | 2.66                     | 2.88                         | 0.71-2.88            |
| CeO <sub>2</sub>               | 3.72                     | 2.45                         | 2.06                     | 1.87                         | 1.87-3.72            |
| F <sub>2</sub>                 | 0.21                     | 0.21                         | 0.21                     | 0.21                         | 0.21                 |
| Total                          | 100.08                   | 99.95                        | 99.96                    | 99.96                        |                      |

It should be apparent that the exact coating compositions and the ranges specified are by no means critical and good coatings have been produced by using slightly different frit compositions and batch proportions. The overall fired coating composition range for nineteen different frit mixtures similar to those shown in Examples I and II and five different batch formulations where excellent coatings were obtained is shown in the following table. With the exception of barium, boron and silicon, the remaining oxides can be grouped as follows. Those which are basic in character are identified generally as the R<sub>2</sub>O and RO groups, those behaving essentially as neutrals are classed as the R<sub>2</sub>O<sub>3</sub> group, and those being in general acidic as

the RO<sub>2</sub> group with minor traces of fluorine and phosphorus.

TABLE III

| Ingredient:                   | Overall composition range,<br>weight percent |
|-------------------------------|----------------------------------------------|
| R <sub>2</sub> O              | 0.88-4.10                                    |
| BaO                           | 16.80-30.50                                  |
| RO                            | 2.93-10.63                                   |
| B <sub>2</sub> O <sub>3</sub> | 6.38-8.81                                    |
| R <sub>2</sub> O <sub>3</sub> | 2.49-18.35                                   |
| SiO <sub>2</sub>              | 36.40-51.30                                  |
| RO <sub>2</sub>               | 1.06-16.79                                   |
| Trace                         | 0-0.05                                       |

Suitable opacifiers which have matured well when the coating is fired and have shown good hiding power are

uverite consisting essentially of CaO 24.6%, CaF<sub>2</sub> 4.9%, TiO<sub>2</sub> 30%, and Sb<sub>2</sub>O<sub>3</sub> 40.6%; and Superpax (zirconium silicate) consisting essentially of ZrO<sub>2</sub> 63.3% and SiO<sub>2</sub>

34.7%. Suitable flocculents or deflocculants can be used depending on the desired viscosity of the slip preparation. Potassium nitrite for example has been used and acts as a flocculating agent. Ordinary enamellers clay additions are made to the batch to aid in particle dispersion and suspension.

Good color qualities of charcoal, coppertone, pink and turquoise, as well as others, may be produced by adding amounts of colorant to the batch in the proportions desired. Certain of these commercial colorants were examined spectrographically and the principal elements, present apparently as oxides, which contribute to the color development in the coatings are listed in Table IV.

Table IV

| Color Coating                   | Elements Present in Colorants Which Appear to Contribute to Color Development in Coating |    |
|---------------------------------|------------------------------------------------------------------------------------------|----|
| Charcoal.....                   | Cr, Fe, Co, Cu.                                                                          | 5  |
| Gray.....                       | Cr, Fe, Co.                                                                              |    |
| Dark and Light Coppertones..... | Cr, Fe, Cu, Zn.                                                                          | 10 |
| Beige and Dark Brown.....       | Cr, Fe, Zn.                                                                              |    |
| Light Blue.....                 | Co.                                                                                      |    |
| Olive.....                      | Cr, Fe, Co, Zn.                                                                          |    |
| Pink.....                       | Ag, Au, Cr, Sn, Sb, Ti.                                                                  |    |
| Yellow.....                     | Pb, Sb, Zn.                                                                              |    |
| Turquoise.....                  | Co, Cr, Pb, Sb, Zn.                                                                      |    |

As previously mentioned, surface preparation of the metallic burner base is an important factor. But equally important is the selection of the proper alloys to be used. As a general statement, it might be said that certain stainless steels generally designated as the AISI 400 series have not worked while stainless steels designated as the AISI 300 series produced excellent results.

Both 300 and 400 series steel were coated, fired and subjected to thermal shock test. This test consisted of 10 quench cycles from 1250° F. to room temperature in air.

The coated 400 series steels could not withstand the thermal shock test and produced mild crazing or developed expansion cracks at some point during the test. Conversely, the 300 series steels which have a higher coefficient of expansion than the 400 series surved the tests well. The 300 series steels are characterized by having an excess of 23% chromium and nickel with the chromium content being not less than 16% resulting in a predominately metastable austenitic structure at room temperature. These steels have a coefficient of thermal expansion from 0 to 1500° F. of between 10 and 12 micro-inches/in./° F. as opposed to the 400 series steels, which do not contain nickel in any appreciable amount, and have a coefficient of thermal expansion between 6 and 7 micro-inches/in./° F. through the same temperature span.

The ability of the coating to fit or bond and withstand high temperatures and thermal shock on the 300 series steels while failing on the 400 series steels is attributed to greater residual compressive stresses which result after firing. In other words, the relatively low expansion rate of the ceramic coatings is matched with the relatively high expansion rate of the austenitic 300 steels within the range of operation intended so that a residual compressive stress in the coatings is produced which is sufficient to overcome any tensile stresses resulting from thermal cycling. Apparently, the thermal expansion rate of the 400 series steels is too low to build up high enough residual compressive stresses.

Having now described our invention in sufficient detail for those skilled in the art to practice it, it is apparent that modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A support element adapted to be positioned on a range top in spaced relation to the heat producing means and for supporting a cooking utensil on a range top while said cooking utensil is being heated to the cooking temperature and being characterized by an operating temperature of about 1100° F.,

said support element being formed of a structural material having a metallic base and a fused ceramic coating bonded on the upper surface thereof, the predominant ingredients of said coating consisting of the oxides of barium, boron, and silicon, and the metallic base having a coefficient of thermal expansion substantially equivalent to that of an austenitic-steel.

2. A support element adapted to be positioned on a range top in spaced relation to the heat producing means and for supporting a cooking utensil on a range top while said cooking utensil is being heated

to the cooking temperature and being characterized by an operating temperature of about 1100° F., said support element being formed of a structural material having a metallic base and a fused ceramic coating bonded on the upper surface thereof, the predominant ingredients of said coating consisting of the oxides of barium, boron, and silicon and the remainder consisting essentially of the oxides of the alkaline and alkaline earth metals and the oxides of aluminum, bismuth, antimony, titanium, zirconium, and cerium and the metallic base having a coefficient of thermal expansion substantially equivalent to that of an austenitic-type steel.

3. A support element adapted to be positioned on a range top in spaced relation to the heat producing means and for supporting a cooking utensil on a range top while said cooking utensil is being heated to the cooking temperature and being characterized by an operating temperature of about 1100° F.,

said support element being formed of a structural material having a metallic base and a fused ceramic coating bonded on the upper surface thereof, the predominant ingredients of said coating consisting of the oxides of barium, boron, and silicon and the remainder consisting essentially by weight of the oxides from the groups  $R_2O$  0.8-4.10%,  $RO$  3.0-11%,  $R_2O_3$  2.0-19%, and  $RO_2$  1.0-17% and the metallic base having a coefficient of thermal expansion substantially equivalent to that of an austenitic-type steel.

4. A support element adapted to be positioned on a range top in spaced relation to the heat producing means and for supporting a cooking utensil on a range top while said cooking utensil is being heated to the cooking temperature and being characterized by an operating temperature of about 1100° F.,

said support element being formed of a structural material having a metallic base and a fused ceramic coating bonded on the upper surface thereof, the major proportions of said coating consisting essentially by weight of 16-30%  $BaO$ , 6-9%  $B_2O_3$ , and 36-52%  $SiO_2$  and the base metal having a coefficient of thermal expansion substantially equivalent to that of an austenitic steel.

5. A support element adapted to be positioned on a range top in spaced relation to the heat producing means and for supporting a cooking utensil on a range top while said cooking utensil is being heated to the cooking temperature and being characterized by an operating temperature of about 1100° F.,

said support element being formed of a structural material having a metallic base and a fused, colored ceramic coating bonded on the upper surface thereof, the major proportions of said coating consisting by weight of 16-30%  $BaO$ , 6-9%  $B_2O_3$ , and 36-52%  $SiO_2$  and the remainder consisting essentially by weight of oxides selected from the groups  $R_2O$ , 0.8-4.10%,  $RO$  3.0-11%,  $R_2O_3$  2.0-19%, and  $RO_2$  1.0-17% and a relatively small amount of vitreous enamel colorant,

the base metal having a coefficient of thermal expansion substantially equivalent to that of an austenitic steel.

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