

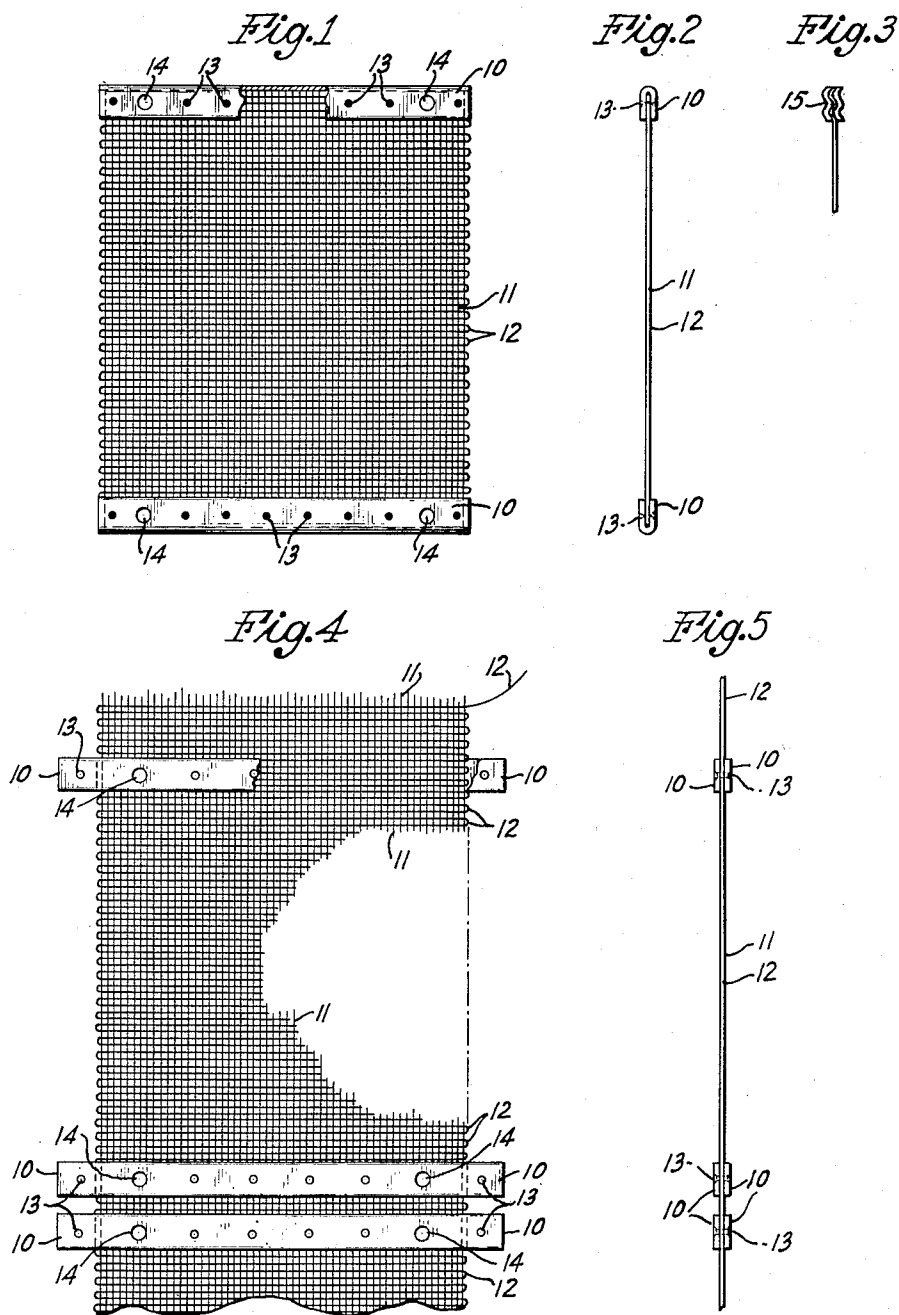
Aug. 14, 1956

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2,759,092

ELECTRICAL HEATING UNIT AND PROCESS OF MAKING THE SAME

Filed Sept. 25, 1953



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1

2,759,092

ELECTRICAL HEATING UNIT AND PROCESS OF MAKING THE SAME

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Application September 25, 1953, Serial No. 382,282

3 Claims. (Cl. 219-46)

This invention relates to electrical heating units and particularly to heating units of the woven wire type adapted for use in an electrical bread toaster.

Objects of the invention are an increase in the heat radiating efficiency of electrical heating units for toasters, a decrease in the time required for such a unit to attain maximum temperature after energization and a simplification of the structure and method of making such units thereby to facilitate quantity production and a reduction in the cost of such units.

This invention is an electrical woven wire heating unit comprising a glass yarn warp, a wire woof and a clamp of conductive material at each end of the conductive fabric fixing the end of the fabric therein, the clamps being designed to serve as electrical connecting terminals for the unit and also as rigid mounting elements for mounting the unit in an electrical bread toaster or other electrical appliance for use in which such a unit is adapted.

A feature of the invention is an electrical woven wire heating unit as described in the preceding paragraph comprising a single continuous fine wire of low resistance material interwoven with a glass yarn warp, the wire being nickel or chrome plated to increase its heat radiating efficiency and to increase its life without substantial change in resistivity, the plating being a light plating so as not to materially increase the resistivity of the wire and so as not to make the wire brittle. The size of the wire is selected to produce a heating unit of desired resistance and power rating when connected to a power supply of standard voltage. The high radiating efficiency and low mass of this unit result in rapid heating and cooling of the unit.

A further feature of the invention is the process of making electrical heating units comprising the interweaving of a continuous wire conductor through threads of glass yarn to form a ribbon of electro-conductive fabric, successively attaching opposing metal plates across the ribbon at spaced positions to clamp the ends of desired lengths of ribbon therebetween, and cutting the ribbon between adjacent clamps to form electrical heating units of desired length and resistance.

A further feature of the invention is an electrical heating unit of the character described in the preceding paragraphs, the fabric being woven to expose a larger percentage of the wire conductor on one side of the unit than on the other side, thereby to increase the heat radiating capability of one side of the unit.

A clear and complete understanding of the invention will be facilitated by describing a heating unit embodying the invention and its features, one such unit particularly designed for use in an electrical bread toaster being shown in the drawing. The invention is not limited to the specific structure shown and is generally applicable to woven wire electrical heating units. Though a simple plain or "tabby" weave is shown, the invention is not limited to this weave. Any other suitable known weave, such as "twill," "rep," "herringbone," "satin" etc., can be used, a weave which exposes more of the conductive wire one side of the

2

fabric than on the other side being preferred for heating units adapted for use in electrical toasters.

Referring to the drawing, which consists of five figures—

Fig. 1 is a front view of a woven wire heating unit; Figs. 2 and 3 are alternative partial end views; and Figs. 4 and 5 are front and end views of a ribbon of woven wire fabric with clamping plates attached before cutting the ribbon into units.

The heating unit shown in Fig. 1 of the drawing consists of a piece of electrically conductive woven wire fabric, the top and bottom edges of which are fixed between the opposing plates of clamps 10. The fabric may be woven in a long ribbon and then cut into pieces of desired length, one for each heating unit. Glass yarn threads 11 form the warp of this fabric, a single continuous wire 12 of low resistance conductive material, such as copper, being interwoven with the glass yarn threads. The wire, which is of a size selected to produce a heating unit of desired resistance and power rating, when connected to a power supply of standard voltage, is nickel or chrome plated to increase its heat radiating efficiency and also to prevent deterioration which would otherwise reduce the useful life of the unit. The plating is a light plating so as not to materially increase the resistivity of the wire and so as not to make the wire brittle. The wire and yarn form an open mesh so as to insure maximum radiation; and, since the mass of the unit is low, it acquires maximum temperature rapidly when connected in circuit with the power supply and also cools rapidly when the power supply is disconnected therefrom.

The plates of clamp 10, at each end of the unit, are shown as being fixed to each other by rivets 13 but alternatively may be spot welded together. The clamp plates are preferably made of steel and are nickel or chrome plated so as to have a high radiating efficiency and to minimize deterioration. The clamp plates may be flat as shown in Figs. 1, 2, 4 and 5 or may be ribbed as are the plates 15 shown in Fig. 3. The clamps 10 have suitably positioned mounting holes 14 therein as shown in Figs. 1 and 4; or, if the ends of the clamps extend beyond the fabric as shown in Fig. 4, the mounting holes may be in the extending ends. Further, the opposing plates forming a clamp may be bent over portions of a flat rectangular piece of steel as shown in the end view Fig. 2. The ends of the woven wire fabric may be welded, or soldered with a high melting point solder, between the opposing clamp plates, if desired; and the lead-in conductors from the power supply may be fastened to the clamps, one at the top and the other at the bottom in like manner, if desired.

To facilitate and simplify the quantity production of heating units as shown in Fig. 1, a continuous ribbon of the woven wire fabric, for instance one thousand yards, may be woven and the clamps 10 be affixed in succession at the required positions on the ribbon, before cutting into units, as illustrated by Figs. 4 and 5. This method eliminates the possibility of unraveling of any of the wire at the ends before the clamp is attached and lends itself to rapid and economical production.

While the fabric illustrated in Figs. 1 and 4 is a plain or "tabby" weave, many other standard weaves can be used, such as "twill," "rep," "herringbone" and "satin." For heating units particularly designed for use in electrical bread toasters, the weave should be one exposing a large part of the conductive wire on one side, thereby increasing the heat radiation of the side adjacent the bread to be toasted.

The invention and its features are not limited to the specific form and details of structure shown and described above but include equivalents within the spirit of the invention.

3

What is claimed is:

1. A rectangular electrical heating unit comprising a piece of electro-conductive fabric having glass yarn threads interwoven by a single continuous wire of fine gauge and of low-resistance material, said wire having a light chrome plating, and chrome plated steel clamps formed by opposing plates extending along the top and bottom edges of said piece of fabric, the opposing plates of each clamp being fixed together to clamp the fabric therebetween, said clamps constituting connecting terminals for connection to a power supply and being formed to enable mounting on a supporting structure.

2. A rectangular electrical heating unit comprising a piece of electro-conductive fabric having glass yarn threads interwoven by a single continuous wire of fine gauge and of low-resistance material, said wire having a light nickel plating, and nickel plated steel clamps formed by opposing plates extending along the top and bottom edges of said piece of fabric, the opposing plates of each clamp being fixed together to clamp the fabric therebetween, said clamps constituting connecting terminals for connection to a power supply, said clamps being formed with mounting holes therein to enable attachment to a supporting structure with the piece of fabric stretched therebetween.

3. The process of making rectangular woven wire electrical heating units having a desired resistance and power

4

rating consisting of interweaving a continuous wire conductor of desired size through threads of glass yarn to form an electro-conductive fabric, the pattern of the weave being such as to expose a larger part of the surface of the wire on one side of the fabric than on the other, successively fixing to each other opposing rigid metal plates at spaced positions along the ribbon, the opposing plates being on opposite sides of the ribbon to clamp the ends of desired lengths of the ribbon therebetween, and cutting the ribbon between adjacent clamps to form separate heating units of desired length, the clamps of each unit serving as electrical terminals for the ends of the wire conductor and as mounting plates for supporting the unit in desired operative position.

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