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ELECTRIC HEATING UNIT ASSEMBLAGE

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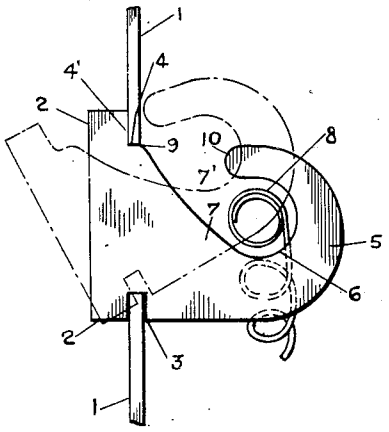


Fig. 1

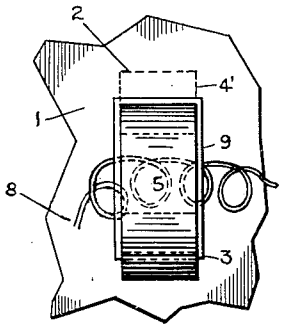


Fig. 2

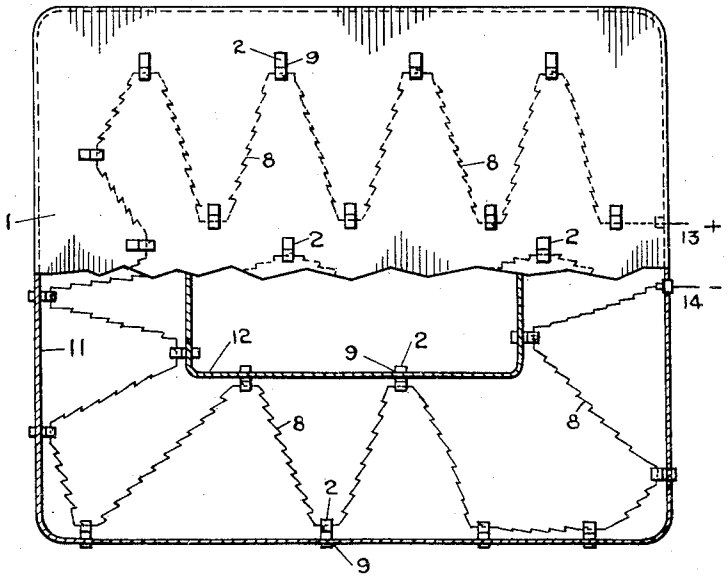


Fig. 3

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ELECTRIC HEATING UNIT ASSEMBLAGE

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8 Claims. (Cl. 219—19)

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This invention relates to insulators for electric wire, cables and the like and more particularly for insulators used to support coiled resistance wires used in the heating elements of electric ovens and broilers. These are commonly called bushings.

One object of the invention is to provide an insulator-support which can be quickly and easily installed in its base plate and by unskilled labor, and which when so installed will be securely and immovably fixed in position and can have the resistance wires mounted therein with equal facility.

Another object is to provide an insulator-support or bushing and means for mounting it in the plate which permits various arrangements and enables the maker to obtain the best heat pattern in the oven.

Another object is to provide an insulator-support which is easily replaceable without disconnecting the resistance wire system or disturbing other insulators which jointly aid in supporting an electric heating element.

Another object is to provide an insulator-support which when in place acts in the dual capacity of a heating element support and as a corrosion protector for the metal plate on which it is mounted, there being relatively few exposed edges of the plate as potential corrosion starting points.

Another object is an insulator-support which provides a more even distribution of resistance wire tension and which will continue to support a heating element even though some of the tension is relaxed due to breakage of a coacting insulator-support or a resistance wire or damage to the latter, or otherwise.

Another object is to reduce to a minimum the number of parts required to make a complete heating element assembly, thereby simplifying and strengthening the structure and reducing the chances of failure of competent parts.

Other objects and advantages of this invention will be obvious from the following description and the accompanying drawings.

Referring to the drawings:

Fig. 1 is a side view of an insulator-support with resistance wire therein in position on a base plate constituting an exemplary embodiment of the invention;

Fig. 2 is a plan view of the insulator-support attached to a base plate;

Fig. 3 is a plan view of electric heating units, base plates and insulator-supports on a reduced scale, embodying the invention, the top plate being broken away to expose the bottom structure.

Referring to the drawings, 1 is a top base plate such as is employed for a broiler while 11, 12 are open bottom frames constituting base metal plates disposed edgewise vertically of an oven or other heating compartment. 2 is the base of the insulator-support or holder which has substantially rectangular recess 3 cut in it at the tap of its base on one side and a rounded shoulder or step 4 located at its opposite side. Preferably the recess 3 and shoulder 4 are made of a width only slightly greater than the thickness of the base plate 1 and are on the same level, so that the outer side of the base plate and the end edges of its oblong opening 9 are engaged by them. The outer or heating element holding portion of the insulator-holder is in the form of a hook 5 of considerable thickness whose bottom at 6 is made of a size to accommodate the diameter of the helical wire heating element 8 while the distance between the terminal end 10 of the hook and its shank 7 is slightly less than the diameter of the spiral resistance element used. Thus in assembly the said element is snapped or forced into the supporting loop or section 6 through the said channel, 7', which tapers inwardly. In the drawings, as shown in Fig. 2, the preferred form of base plate 1 is provided with rectangular openings 9 whose length is approximately the distance between the bottom of recess 3 and the shoulder 4 and whose width is the width of the insulator-support.

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The openings 9 and the insulating holders positioned therein are of any desired number and are arranged in any desired positions, though preferably in staggered relation, to give any suitable heat pattern, but be arranged so that the tension of the resistance wire causes pressure against the bottom 6 of the hook or loop. They are also so located that the holding insulators depend downwardly from the upper plate 1 and extend inwardly from the frames 11 and 12 and are drawn toward that position by the tension. If a bottom horizontal plate is employed, the back of the loop 6 may be extended so that the said holders cannot gravitate down through the opening if the tension is released. This extension should be located just above recess 4.

In practice the arrangement of the heating element is decided upon and exact sized rectangular orifices cut at critical extremes, as shown in Fig. 3. The oven or other heater is then assembled and the plates with insulator-supports thereon placed in position therein.

By reason of the peculiar construction of the insulator-supports it is necessary to tilt them so that the stepped portion carrying the step 4 enters the orifice first, at such an angle that when the hook terminus 10 approaches or touches the plate 1, as shown in dotted lines in Fig. 1, the insulator-support may be swung so that the plate 1 may be received by the recess 3. Only after the plate 1 is within the recess 3 may the insulator be turned back so that the bottom 4' of the step or shoulder 4 rests against the

back of the plate. If the insulator-supports need to be removed for any reason this may be done by reversing the above described procedure, and without disturbing the others or the resistance wire. Should the said wire become broken from any cause it can be removed from the insulator-holders and replaced by another without disturbing the holders, which will remain in position despite the release of tension of the wire. Nor will the latter fall out of position if broken, since the frictional coaction between them and the loops is always sufficient to hold them in place. After the insulating supports or holders are in position the heating element 8 is snapped into place and connected to suitable outlets, as indicated at 13 and 14. This is done under proper tension.

It will be seen from the foregoing, that no lock or other connecting means between the insulator-holders and the plate is required, since the plate at the edge of each holder is gripped by the recess 4, and cannot be released except by a turning and then a sliding movement of the holder, the turning movement being necessary to remove the opposite edge of the aperture from abutment with the shoulder; that a simple die construction only is required to make the elongated apertures; that lacing the coiled resistance wire is reduced to a very simple operation quickly and easily performed; and that replacing the resistance wires and insulator-holders is likewise a simple and easy operation which can be performed as to one or more without disturbing the others. It will also be seen that no twisting or turning of the resistance wires or holders is necessary to connect and secure these parts, and that no movements of the holder after it is engaged by the wire is necessary. Nor is any rotary movement of the insulator-holders necessary to mount it in its plate or release it therefrom. Other advantages of the improvements will be apparent to those familiar with the devices of this character and their manufacture and use.

Various changes in the details of construction of the exemplary embodiment of the improvements herein shown and described may be made, such as may be necessary to improve its functions or adapt it to other or more extended uses, without departing from the scope of the invention. Thus the frame and insulator-holders at bottom may be omitted and a heating unit of the "calrod" type substituted, and the form of the resistance wires may be varied according to the best practices of the art and the judgment of the manufacturer. The form of the hook-shaped holder may also be varied to coact with different forms of resistance wire or for other purposes. It is important to the invention, however, that the insulator-holder shall in normal use be held in proper position in the backing plate or frame and the parts be secured in their correct operative positions and relations by the tension of the resistance wire.

One of the specific features of the improvements is found in the form of loop section 6, which is preferably made of strong porcelain and has substantially rectangular edges, which engage the convolutions of the resistance wire passing therethrough under tension and extending away from the holder on both sides at an angle thereto. This ensures positive engagement between the interior of the hook or loop and the resistance wire and prevents the latter at all times from slipping therethrough, even should it become stretched or broken, and the maintenance of the holder in proper position in the metal plate by the tension of the resistance wire, so that contact between the said wire and the plate cannot occur.

Certain features relating to the construction herein shown and described are described and claimed in my copending application filed August 2, 1949, Serial No. 108,219.

What I claim is:

1. In a device of the character described, a base plate having a series of openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

2. In a device of the character described, a base plate having a series of rectangular oblong openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

3. In a device of the character described, a base plate having a series of openings therein, in staggered relation, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from

the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

4. In a device of the character described, a base plate having a series of openings therein, removable insulating holders for helical resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

5. In a device of the character described, a base plate having a series of substantially rectangular openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

6. In a device of the character described, a base plate having a series of openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having open wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when

the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

7. In a device of the character described, a base plate having a series of openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess and a shoulder adjacent thereto engaging an edge of the plate opening spaced from the said plate receiving recess a distance approximately equal to the greatest diameter of the plate opening and blocking movement of said holder in a plane parallel to the plate the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein.

8. In a device of the character described, a base plate having a series of openings therein, removable insulating holders for resistance wires positioned in said openings substantially filling said openings and rotatable on an axis parallel to the plane of the said base plate, resistance wires extending through said holders and under lengthwise tension, said holders having wire receiving recesses therein of a size to receive and engage said wires and also having recesses on their opposite sides spaced from said wire receiving recesses of a size to receive and receiving and engaging said plate at the edges of said openings, there being a portion of each of said holders opposite said plate-receiving recess extending beyond the edge of the plate opening on the side of the plate away from the wire receiving portion of the holder and lapping the plate when the other edge of the opening is in the said recess, the tension of said wire when disposed at an angle to the longitudinal axis of the holder being such as to constantly press the inner wall of said plate receiving recess against the edge of the plate therein and to press the said plate lapping portion of the holder against the surface of the plate.

KUNO ROBERT KUENNE.

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