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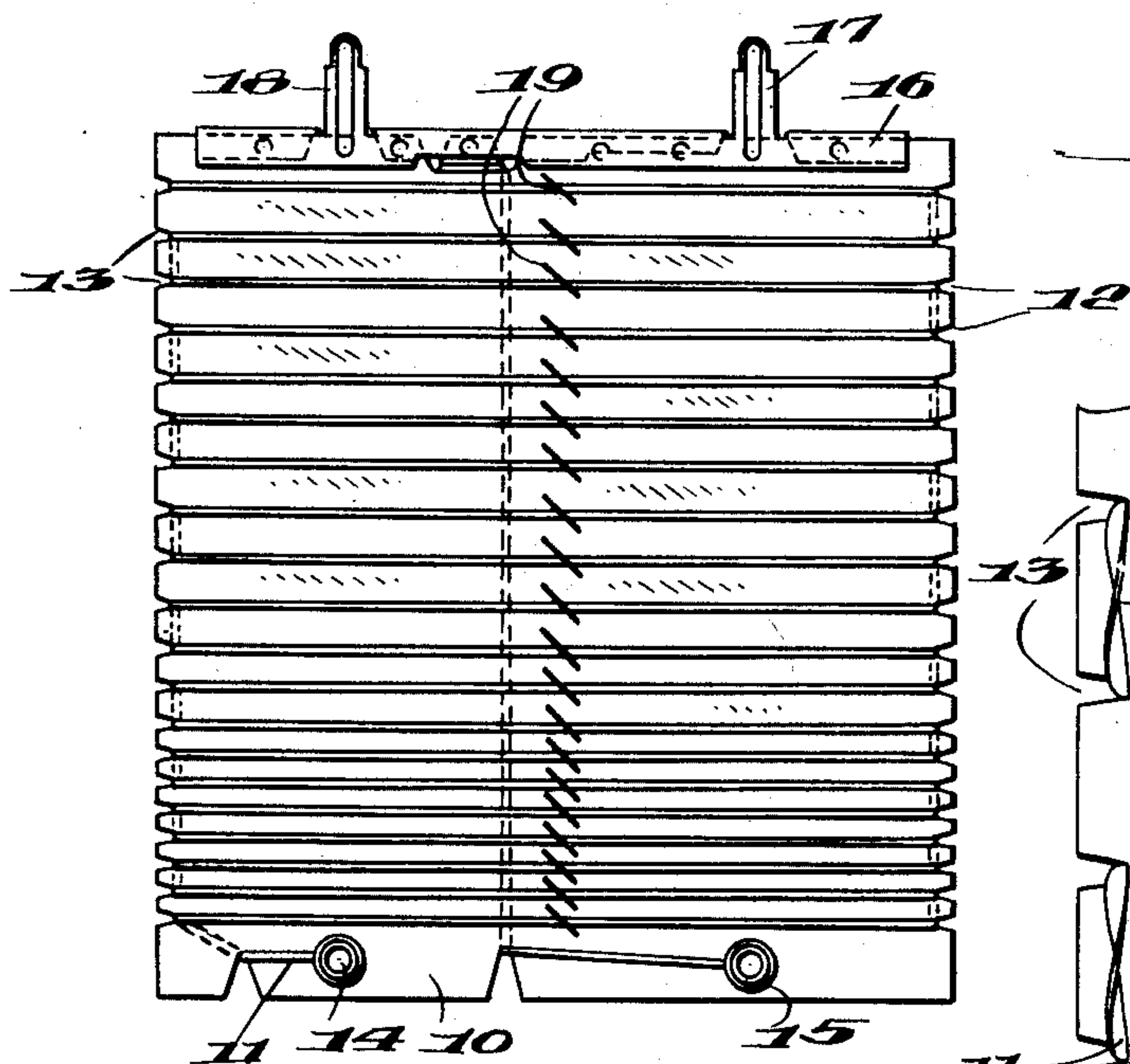
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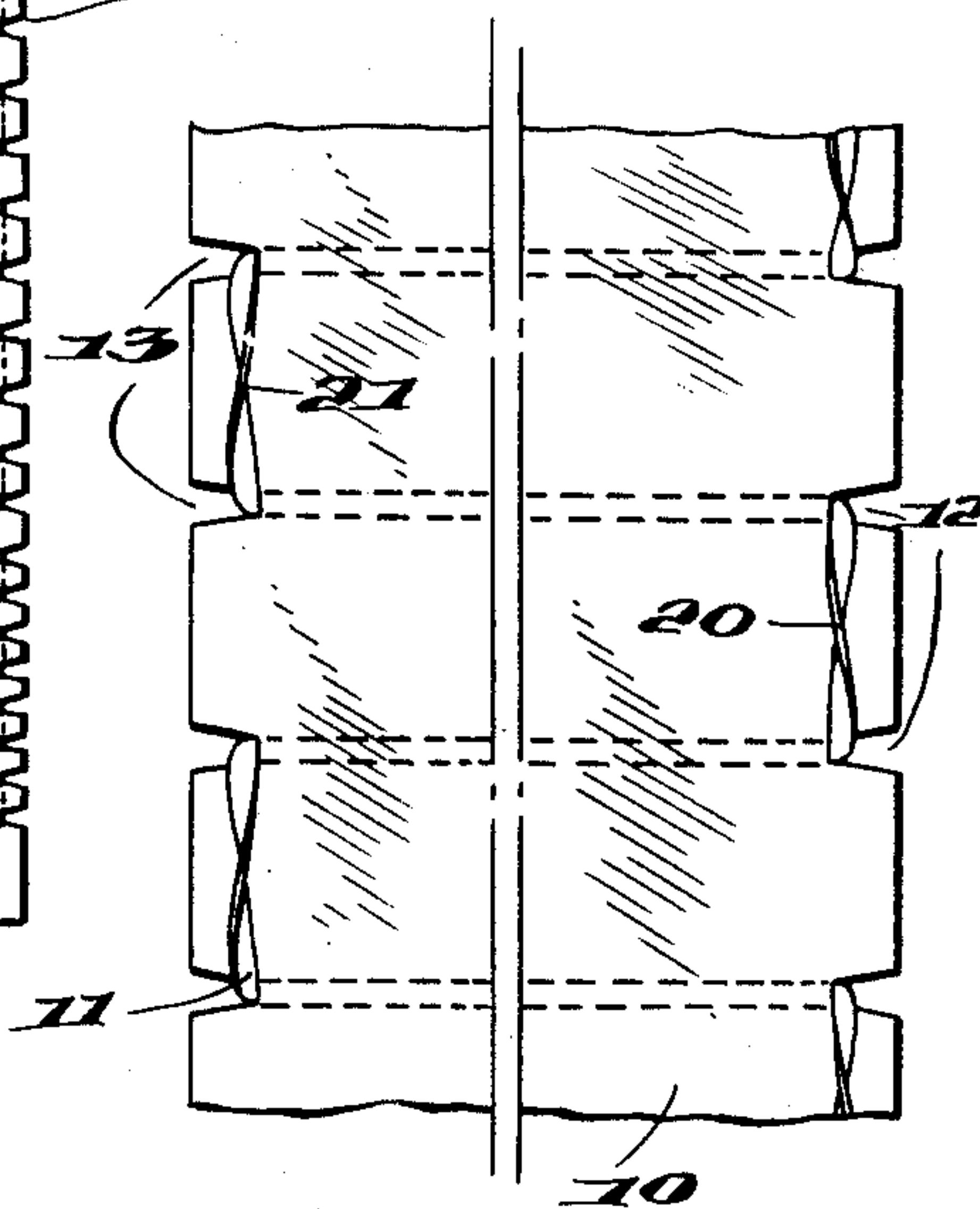
ELECTRIC HEATING ELEMENT

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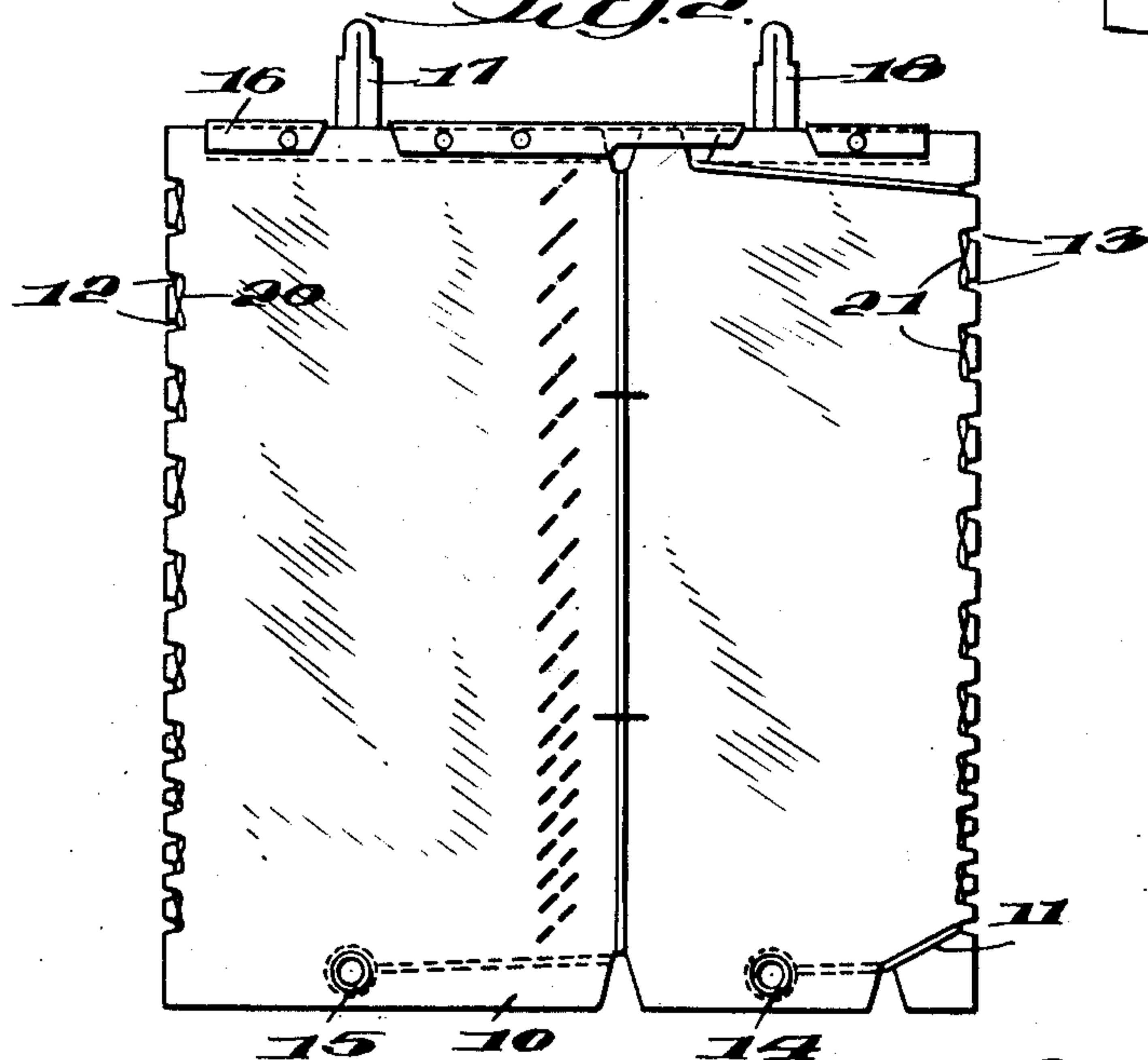
*Fig. 1.*



*Fig. 3.*



*Fig. 2.*



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## UNITED STATES PATENT OFFICE

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## ELECTRIC HEATING ELEMENT

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Application September 20, 1950, Serial No. 185,877

3 Claims. (Cl. 219—19)

1

This invention relates to electric heating elements for toasters and the like of the type having a single heating face and with windings on the heating face anchored by loops engaging spaced notches in opposing edges of a flat insulating form.

The electrical resistance wire commonly employed for such heating elements is of ribbon form. Because of the inherent stiffness and resilience and its flat shape it is not well suited to forming anchoring loops between the windings extending through adjacent closely spaced notches in the edges of the supporting form and anchored at the opposite face of the form from the windings. In particular, the flat ribbon is not well suited to making sharp bends at adjacent notches and frequently sharp creases are formed at the notches.

The general object of the present invention is to improve the anchoring of electrical resistance ribbon windings on a single face of a flat form at notched edges of the form.

According to the invention anchoring loops in the heating ribbon embody an axial twist, ordinarily a half twist. Such twist is found to minimize the formation of sharp creases in the ribbon at the notches and to generally improve the fit of the ribbon with the notched edges. The inherent resiliency of the ribbon may in part account for these benefits.

Desirably, the twists in the ribbon in the loops at the opposite edges of the form are in opposite directions, although this is primarily a convenience in winding.

The twisted anchoring loop formation in the heating ribbon is necessarily provided in the course of winding of the heating element. The same can be produced by hand winding merely through a slight departure, to provide the twist, from the manual technique heretofore employed. It also may be provided by the winding method and with the mechanical machine disclosed and claimed in copending application Serial No. 186,476 filed September 20, 1950 of Waldo H. Zander, Fred D. Zander and Delbert I. Wilson.

The invention will be understood by reference to the accompanying drawing. In such drawing:

Fig. 1 is a front view of an electric heating element according to the invention;

Fig. 2 is a corresponding rear view thereof; and,

Fig. 3 is an enlarged fragmentary rear view showing more clearly the twisted anchoring loop construction.

2

As usual, the flat electrical insulating form 10 will comprise sheet mica but may comprise other suitable insulating material. An electrical resistance ribbon 11 is formed in spaced windings on the front face of the form which extend between opposing side edges containing relatively closely spaced notches 12 and 13. Metal eyelets 14 and 15 are provided in the lower portion of the form for anchoring the ends of the ribbon and providing electric terminals therefor. At the top of the form is a metal clamping strip 16 having upstanding posts 17 and 18 suitable for the support of the heating element. A line of staples 19 may secure the individual windings of the ribbon in supporting contact with the front face of the form, but such feature is not my invention and use thereof is to be considered optional.

At the opposite edges of the form are notches 12 and 13. As conventionally, the spacing of adjacent notches may vary, preferably being more closely spaced in the lower area of the form to provide a greater concentration of heating windings of the ribbon therein than in the upper area. The ribbon between windings extends through adjacent notches 12 and 13 at the opposite edges of the form and is anchored by loop formations 20 and 21 at the back side of the form, best shown in Figs. 2 and 3. Such loop formations in their anchoring portions at the back side of the forms contain an axial half twist as shown and, preferably, the loop formations 20 at one edge of the form have a twist in reverse direction to the twist in loop formations 21 at the opposite edge of the form. Such twists tend to improve the fit of the ribbon with the form and take account of the fact that because of its flat form the ribbon is not adapted to undergo the sharp changes in direction required in passing from the front of the form through the notches and across the back side of the form transversely to the direction of the windings at the front of the form. While the twisted loop formations 20 and 21 have been shown as uniform, it is found in practice the formation of the twists varies. Thus the twist may be concentrated or may be spread out along the loop formation. Such variations will depend upon the manner in which the heating elements are wound and upon the stiffness and resilience characteristics of the electrical resistance ribbon employed. The axial twist is not the result of and is not to be confused with changes in form of the ribbon incidental to change in direction at the notches.



I claim:

1. An electric heating element comprising a flat electric insulating form having spaced notches along opposing edges and an electric resistance ribbon having spaced windings on one face of the form extending between the opposing notched edges and connected by anchoring loops in the ribbon between adjacent windings, said anchoring loops extending through two adjacent notches in one edge of the form and passing over the opposite face of the form in anchoring portions extending between said adjacent notches, said anchoring portions being substantially straight and containing axial twists in the ribbon.

2. An electric heating element comprising a flat electric insulating form having spaced notches along opposing edges and an electric resistance ribbon having spaced windings on one face of the form extending between the opposing notched edges and connected by anchoring loops in the ribbon between adjacent windings, said anchoring loops extending through two adjacent notches in one edge of the form and passing over the opposite face of the form in anchoring portions extending between said adjacent notches, said anchoring portions being substantially straight and containing axial twists in the ribbon, the twists in the anchoring portions along one edge of the form being in a reverse direction to the twists in the anchoring portions along the opposing edge of the form.

3. An electric heating element comprising a

flat electric insulating form having spaced notches along opposing edges and an electric resistance ribbon having spaced windings on one face of the form extending between the opposing notched edges and connected by anchoring loops in the ribbon between adjacent windings, said anchoring loops extending through two adjacent notches in one edge of the form and passing over the opposite face of the form in anchoring portions extending between said adjacent notches, said anchoring portions each being substantially straight and containing an axial half twist in the ribbon.

W. H. ZANDER.

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