Nov. 17, 1953 M. IRELAND 2,659,799

ELECTRIC HEATING ELEMENT

Filed Sept. 20, 1950

Fig. 1.

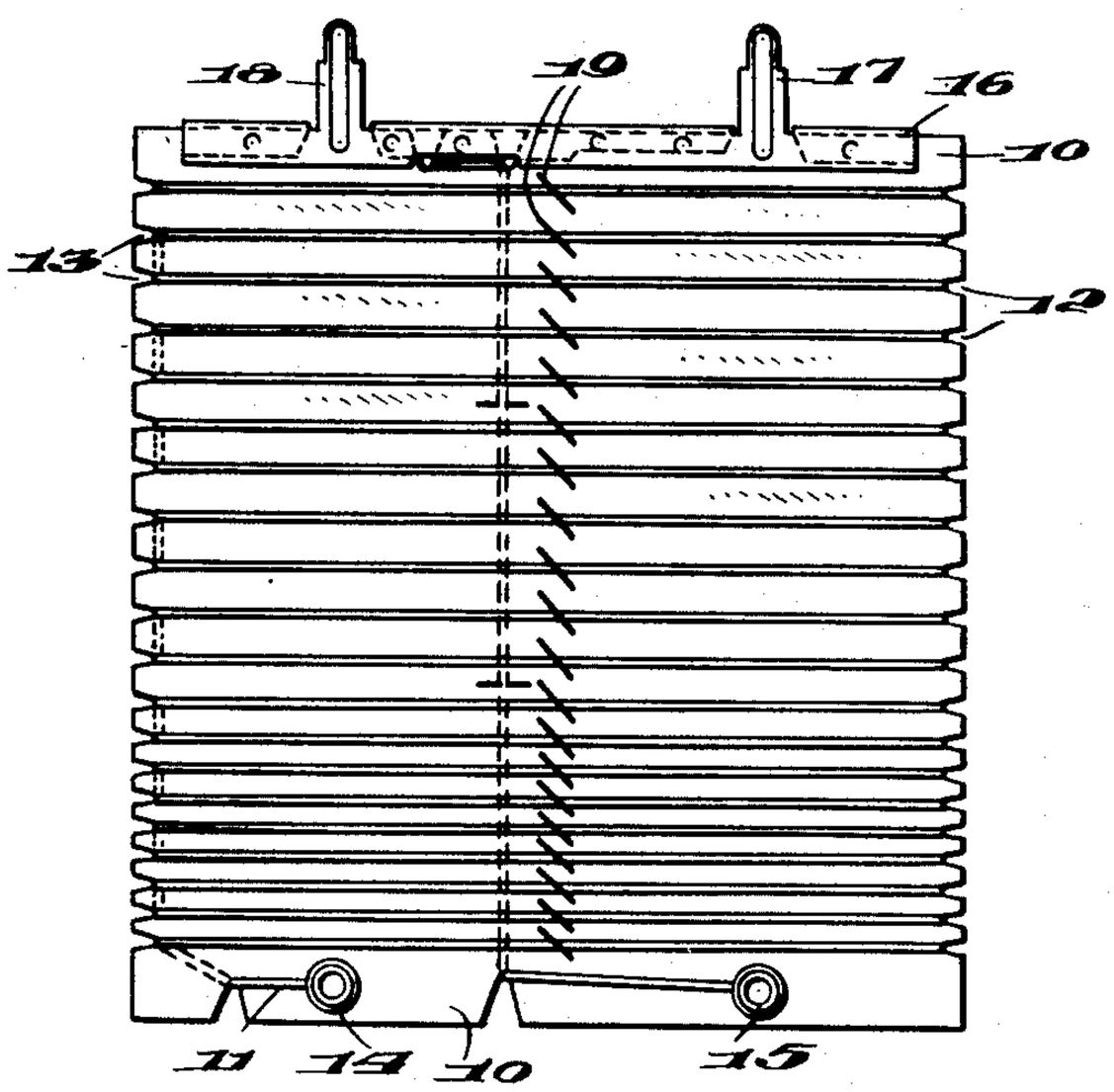


Fig. 2.

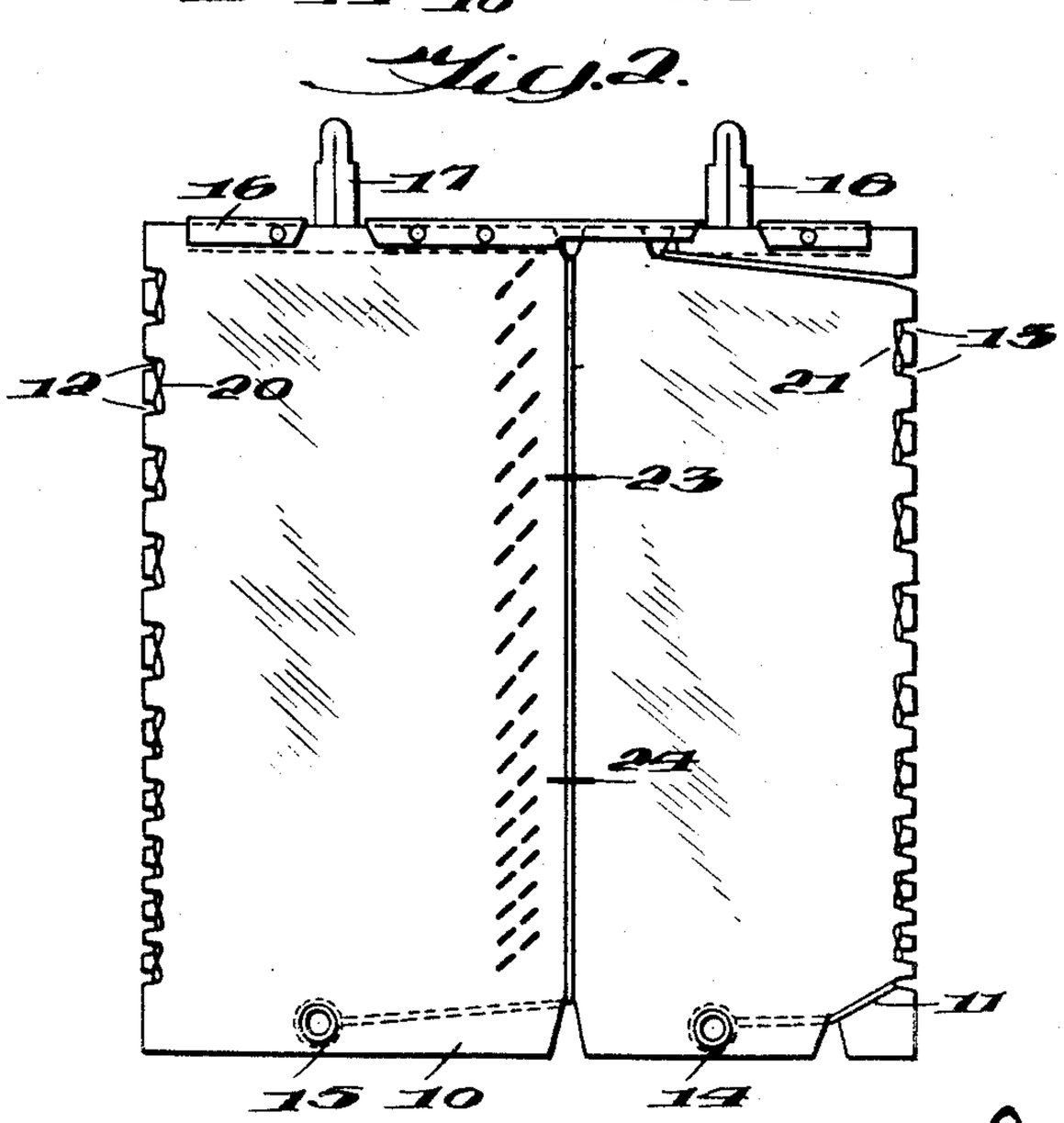
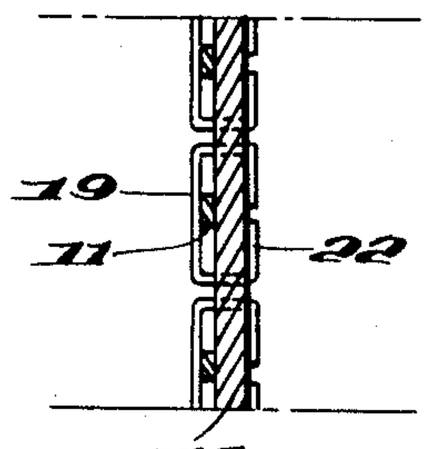


Fig. 3.



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ELECTRIC HEATING ELEMENT

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3 Claims. (Cl. 219—19)

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This invention relates to electric heating elements for toasters and the like, and is particularly directed to an improved construction for securing the heating wire windings.

The electrical resistance wire windings, usually wire ribbon, of heating elements, particularly when heating are likely to sag away from the surface of the supporting form of the heating element. Various proposals have heretofore been made for avoiding this difficulty but, so far as I am aware, none of such proposals have been found practical.

The general object of the present invention is to provide a heating element having the heating windings supported against sagging through a securing construction which will not injure the windings or interfere with the heating effect thereof, and which is adapted for rapid production and otherwise acceptable for commercial employment.

According to the invention the windings of a heating element are anchored to the supporting form by individual securing means in the form of individual thin wire staples adapted to make substantially only point or thin line contact with the heating ribbon or other wire, and further arranged to make merely sliding contact with the wire so as to avoid injury thereto during the course of installation. Because of the close spacing usually employed between the windings of heating elements the use of staples presents a difficulty in that if the staples be of sufficiently small size to avoid short circuiting of adjacent windings they are likely to injure the heating wire in the course of installation. According to the invention it is possible to use staples of a size which can be employed without injury to the wire and which would cause short circuiting between adjacent windings if applied crosswise of the windings. To avoid the latter condition the staples are arranged in inclined relation to the windings. This permits the staples for the windings to be arranged in a line and permits installation of the staples by rapid machine methods.

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 sectional view taken at one of the securing staples.

As conventionally, the flat electric insulating form 10 may comprise sheet mica, but it also

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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 metal clamping strip 16 having upstanding posts 17 and 18 adapted for the support of the heating element. Staples 19 secure the individual windings of the ribbon against the form and will hereafter be more fully described.

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, as shown in Fig. 2. Such loop formations are shown as containing an axial twist, but this is not a part of my invention and is merely optional.

Staples 19 are of thin wire. The yoke thereof bridges an individual winding of the heating ribbon or other wire 11 and the staple legs 22 extend through the form and are bent in anchoring engagement with the opposite face. As previously pointed out, it is desirable that the staples be applied so as not to deform the wire. A light sliding contact between the staple and the heating wire is found suitable for securing purposes. Accordingly, the staples must not be tightly clenched as in the case of other usages.

It will be noted that the staples are relatively wide in relation to the spacing of the windings, and that if applied crosswise they would cause short circuiting. Accordingly they are arranged at a diagonal to the direction of the windings. With such orientation the staples may be disposed in a single line extending vertically to the heating element and transversely to the direction of the windings. The particular heating element illustrated and described has the windings all disposed on the front face of the form. Certain leads of the wire, as shown in Fig. 2 are disposed at the back of the form. These also may be secured by staples 23 and 24 extending from back to front through the form in positions which will not short circuit the windings. It will be under-

stood that the invention is also applicable to heating elements having windings on both sides of the form.

Normally a single staple for each winding provides sufficient support, in which case the staples will preferably be located substantially midway between the opposite edges of the form. Where required, however, a plurality of staples may be employed at spaced points along each winding.

I claim:

1. An electric heating element comprising a flat electric insulating form and an electric resistance wire having spaced straight windings extending across the form and wire staples wider than the wire of the windings and contacting said wire securing the intermediate portions of the individual windings against one face of the form and extending through and being anchored at the other face of the form, said staples extending diagonally to the direction of the windings and adjacent staples lying in spaced relation, and the legs of each staple being spaced by an air gap from the winding secured by the staple.

2. An electric heating element comprising a flat electric insulating form and an electric resistance wire having spaced straight windings extending across the form and wire staples wider than the wire of the windings and contacting said wire securing the individual windings against one face of the form and extending through and being anchored at the other face of the form, said staples extending diagonally to the direction of the windings and said staples being arranged in a common line transverse to the direction of the windings and adjacent staples lying in spaced relation, the legs of each staple being spaced by an air gap from the winding secured by the staple.

3. In an electric heating element, in combination, a sheet of mica having notches along a pair of opposite edges, a resistance wire lying across one face of said sheet of mica in spaced spans of straight wire supported by engagement of looped portions of said wire with said notches, and a row of wire staples wider than the wire of the spans extending through said sheet and clinched thereon, each of said staples of the row straddling one of said spans intermediate its ends for supporting it and with the legs of each staple being spaced by an air gap from the span which it holds, said staples lying at an acute angle to the wire of said spans and in parallel relation with each other whereby to provide spacing of the staple holding each span from adjacent spans and from the staples holding said adjacent spans independently of the spacing between each span and said adjacent spans.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,359,400	Lightfoot	Nov. 16, 1920
1,474,887	Bridges	Nov. 20, 1923
1,480,084	Lamb	Jan. 8, 1924
1,565,539	Woodson	Dec. 15, 1925
1,726,757	Murphy	Sept. 3, 1929
2,040,369	Fischer	May 12, 1936
2,243,993	Watson	June 3, 1941
2,419,355	Koci	Apr. 22, 1947
2,503,601	Tice	Apr. 11, 1950
2,508,357	Ames	May 23, 1950
2,522,724	Scharf	Sept. 19, 1950
2,570,376	Quist	Oct. 9, 1951