

Patented Jan. 2, 1912.

4 SHEETS—SHEET 1

1,013,157.

Fig. 1.

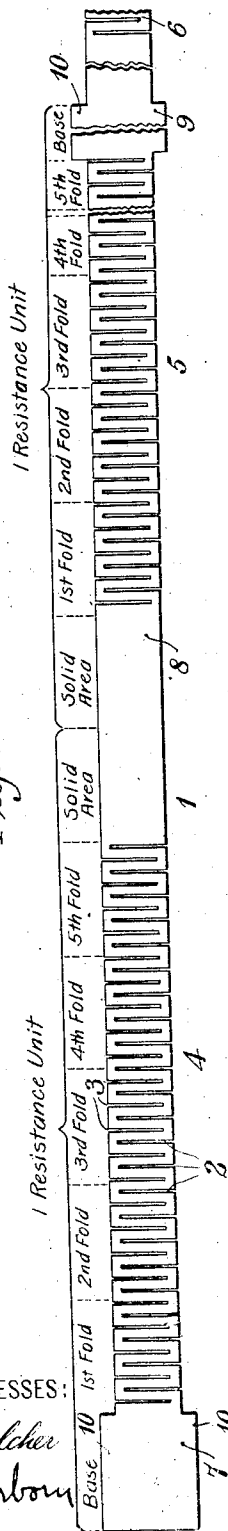
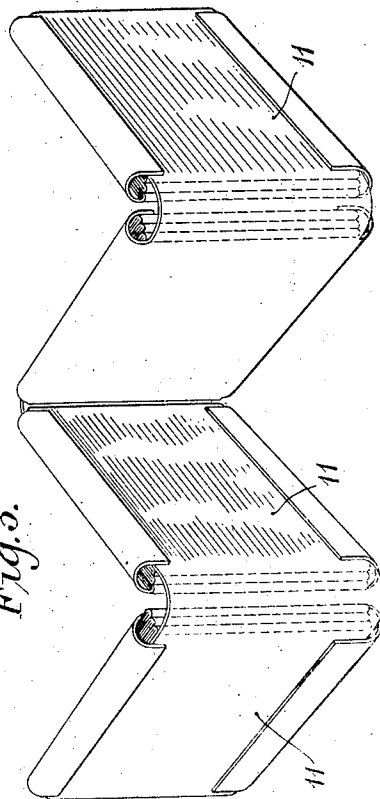


Fig. 2.

Fig. 3.



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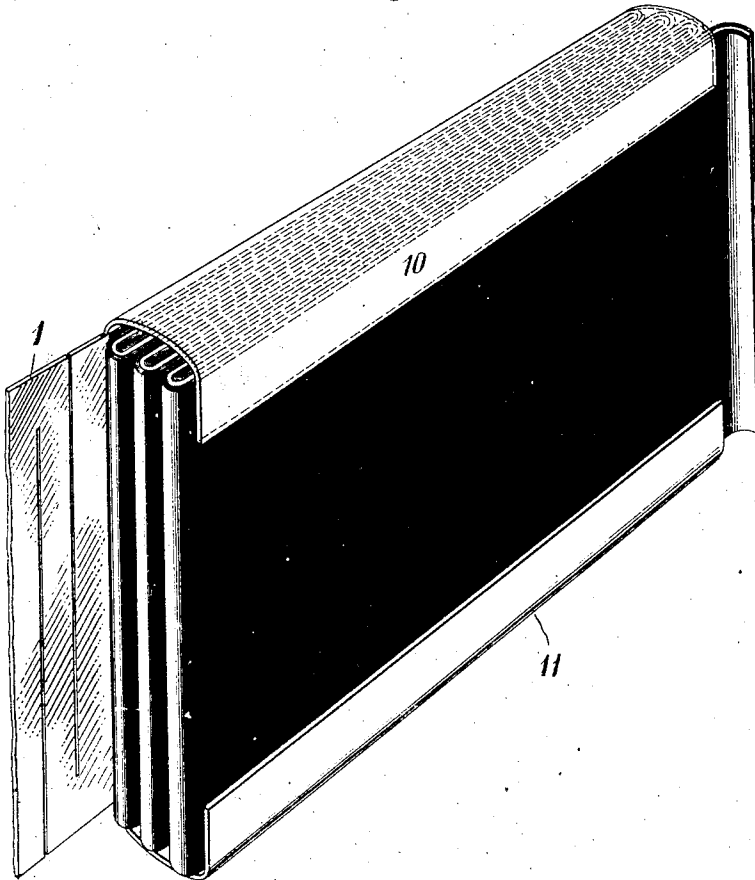
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RESISTANCE OR HEATING ELEMENT.
APPLICATION FILED MAY 1, 1909.

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4 SHEETS—SHEET 2.

Fig. 4.



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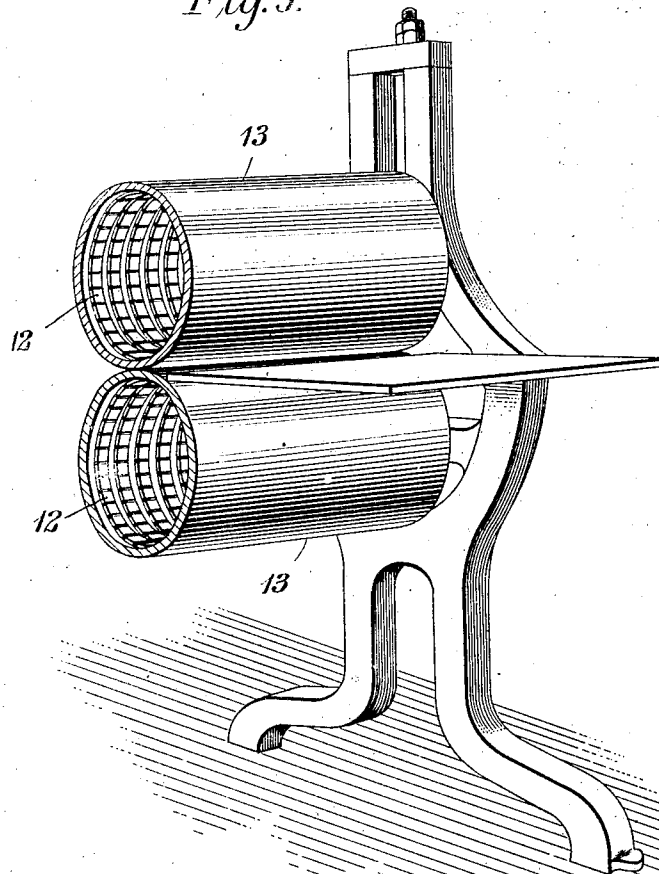
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4 SHEETS—SHEET 3.

Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

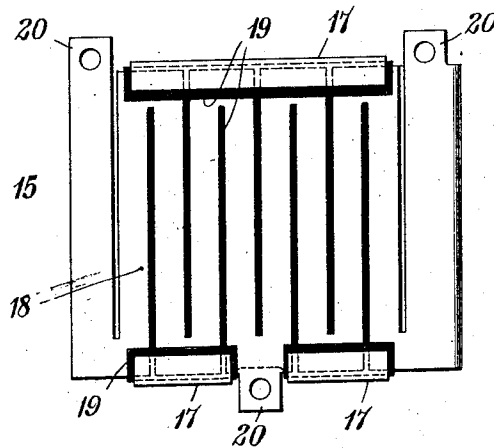
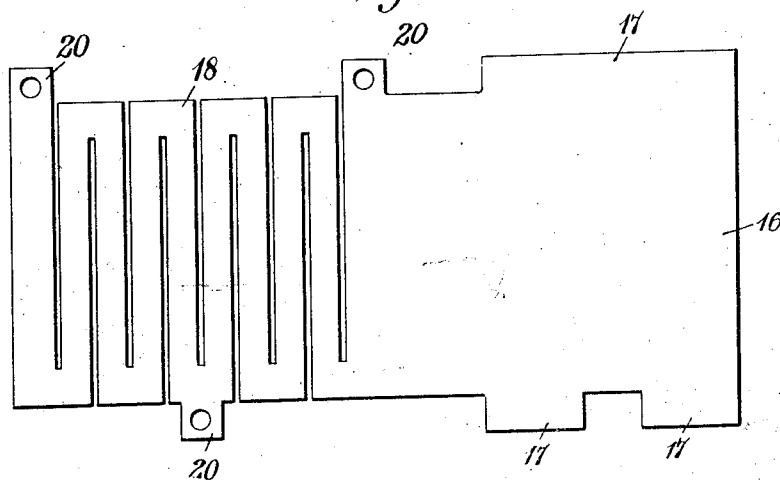


Fig. 7.



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RESISTANCE OR HEATING ELEMENT.

1,013,157.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed May 1, 1909. Serial No. 493,403.

To all whom it may concern:

Be it known that I, WILLIAM S. HADAWAY, JR., a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Resistance or Heating Elements, of which the following is a specification.

My invention relates to electric resistance or heater elements, and it has for its object to provide a simple and durable element or unit of this class that shall have a relatively high resistance and, at the same time, be rigid and self supporting.

Strips or ribbons of steel, or other suitable resistance material, having a plurality of lateral slots to provide zig-zag paths for the electric current, have been largely used in electric heating devices. While these strips or ribbons are tough and durable they are not rigid and have usually been provided with sheaths or some other external supporting means, in addition to their insulating envelops.

According to my present invention, I provide a resistance unit which is formed by folding a resistance strip or ribbon back upon itself and by providing suitably located portions of greater width without slots, the edges of which may be folded over the slotted portions of the ribbon, thereby forming a rigid unit. A single ribbon may obviously be utilized for producing a series of units, so that no additional connections between units shall be required.

Figure 1 of the accompanying drawings is a plan view of a portion of a resistance strip or ribbon which is suitable for producing the unit of my invention. Fig. 2 is a plan view of an insulating strip which is used in connection with the resistance strip of Fig. 1, and Fig. 3 is a perspective view of a series of units constructed in accordance with my invention. Fig. 4 is a perspective view of a single unit, on a larger scale, and Fig. 5 is an outline of a set of electrically heated laundry rolls that serve to illustrate an application of the heater units shown in Figs. 3 and 4. Figs. 6 and 7 are, respectively, an elevation and a detail view of a modified form of resistance unit constructed in accordance with my invention and specially adapted for use in connection with a

well known form of cast grid resistance unit.

Referring to Figs. 1, 2, 3 and 4, a resistance strip or ribbon 1 is provided with a plurality of lateral slots 2 and 3 cut alternately from opposite edges to provide a zig-zag path for the electric current, said slots being arranged in groups such as 4, 5 and 6 which are separated by lengths of unslotted ribbon 7, 8 and 9. Alternate unslotted portions are materially wider than the other portions of the ribbon, in order to provide flanges or edges 10 which may be folded over the narrower parts, as hereinafter described. The ribbon is formed into a series of rigid resistance units by folding back the slotted portions on the unslotted portions and folding over the flanges or projections 10 to hold the ribbon, which has assumed a zig-zag form, in position. For example, if the strip or ribbon shown in Fig. 1 is considered, the portion 4 may be folded back upon the portion 7 and the flanges 10 of the portion 7 finally folded over the edges of the outermost layer, which preferably constitutes one-half of the portion 8. The portion 5 and the other half of the portion 8 are similarly folded on to the portion 9, the flanges of which are bent in a similar manner. By this means, a series of units 11, such as is shown in Fig. 3, is produced. Before the ribbon is folded back upon itself, it is, of course, insulated by some suitable means, such as the ribbon or strip of Fig. 2. The relative position of the insulating strips and the conducting ribbon is clearly shown in Fig. 4.

The resistance units may be utilized for various purposes, of which the set of laundry rolls of Fig. 5 constitutes an illustration. In this figure, a plurality of units are wound in the form of a helix 12 within each of the rolls 13 and may be held in position by any suitable means.

Referring to Figs. 6 and 7 of the drawings, the resistance unit 15 here shown is formed by folding back the unslotted end 16 of the punching or stamping of Fig. 7 and bending the flanges or projections 17 over the zig-zag grid portion 18, after suitable heat-resisting insulation 19 has been interposed between the two parts of the unit, as shown in Fig. 6. This resistance unit is

specially rigid and at the same time may be of relatively high resistance, and inexpensive to manufacture.

The form may be modified so that the projections 20 which form the terminals and the points of support for the device, correspond to any well known form of cast metal resistance grid. By this means, the stamped unit may replace the fragile high-resistance cast grids in the assembled frames or boxes which are so generally employed in electric railway service.

It is evident that variations in the size and arrangement of parts may be effected in the structure illustrated without departing from the spirit of my invention.

I claim as my invention:

1. A resistance strip or ribbon comprising sections of different widths folded upon each other and having the edges of the wider sections bent over the edges of the contiguous narrower sections.

2. A resistance or heater unit comprising a single folded resistance strip or ribbon having relatively wide short sections at convenient intervals, and insulating strips between which the resistance ribbon is assembled, the edges of said wide sections being bent over the edges of the intermediate folded sections.

3. A resistance or heater unit comprising a single folded resistance strip or ribbon having short sections of relatively great rigidity which are secured to the adjacent folded portions.

4. A resistance or heater unit comprising a continuous resistance strip or ribbon having a series of slotted sections separated by

sections of greater rigidity, said slotted sections being folded back upon and secured to the sections of greater rigidity.

5. A resistance unit comprising a punched or stamped grid and a relatively rigid extension of approximately the same length that are folded together, and an interposed insulating sheet or strip.

6. A resistance unit comprising a punched or stamped grid, an integral extension of approximately the same length as the grid but of greater width, and an insulating sheet or strip, said extension being folded upon said strip and said grid and having its edges bent over the edges of the grid.

7. A resistance ribbon comprising slotted and unslotted sections of a given width and of different lengths and unslotted sections of greater width, said slotted sections being folded upon themselves and said wider unslotted sections being folded upon the adjacent slotted section folds and attached thereto by bent-over edges.

8. A resistance unit consisting of resistance material and a ribbon comprising relatively long slotted sections folded upon themselves, relatively short unslotted connecting sections and relatively wide unslotted sections folded against the slotted section folds and secured thereto by bent-over edges.

In testimony whereof, I have hereunto subscribed my name this 20th day of April, 1909.

WILLIAM S. HADAWAY, JR.

Witnesses:

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