

No. 768,764.

PATENTED AUG. 30, 1904.

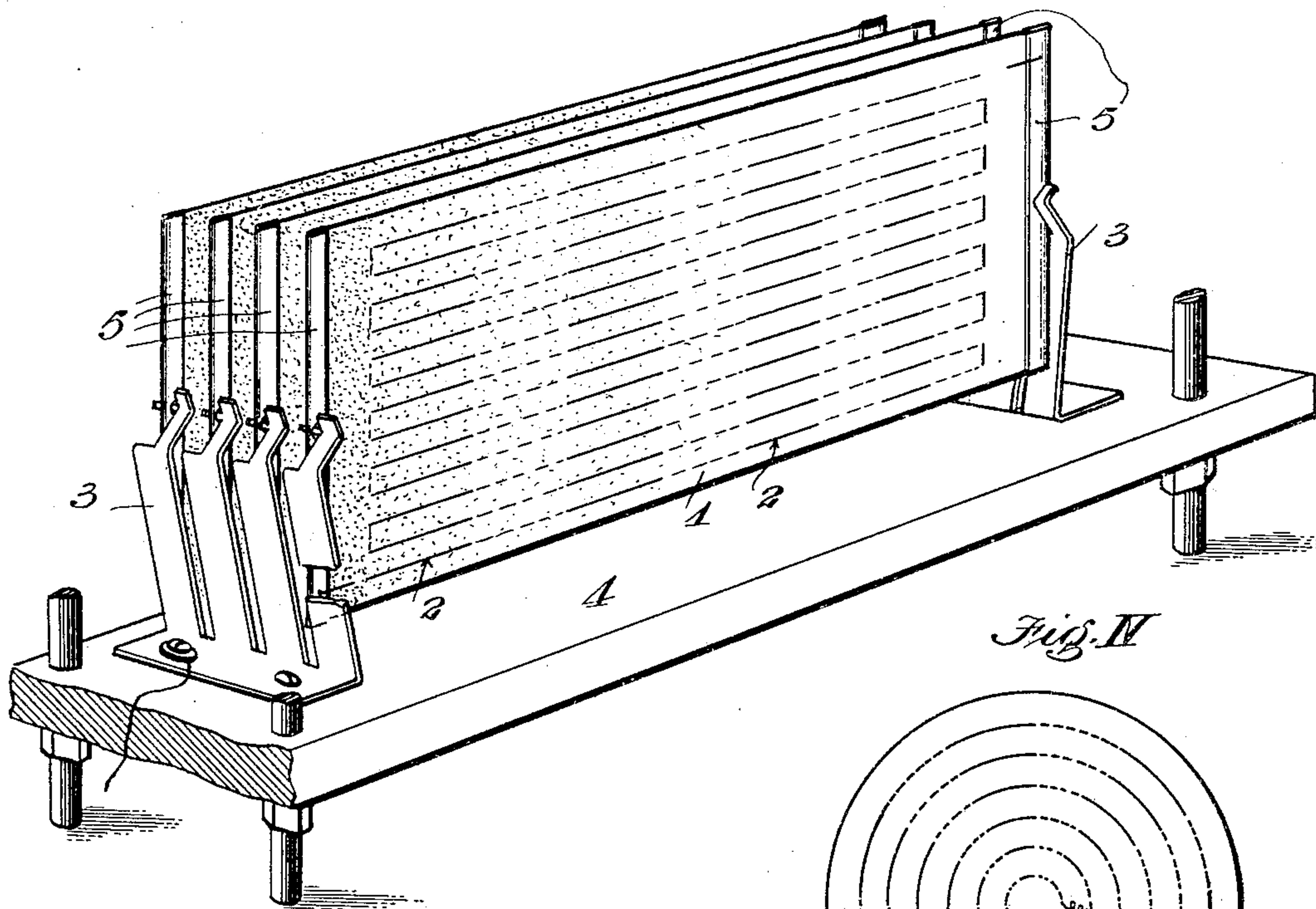
G. I. LEONARD.

RESISTANCE SHEET FOR ELECTRIC HEATERS OR RHEOSTATS.

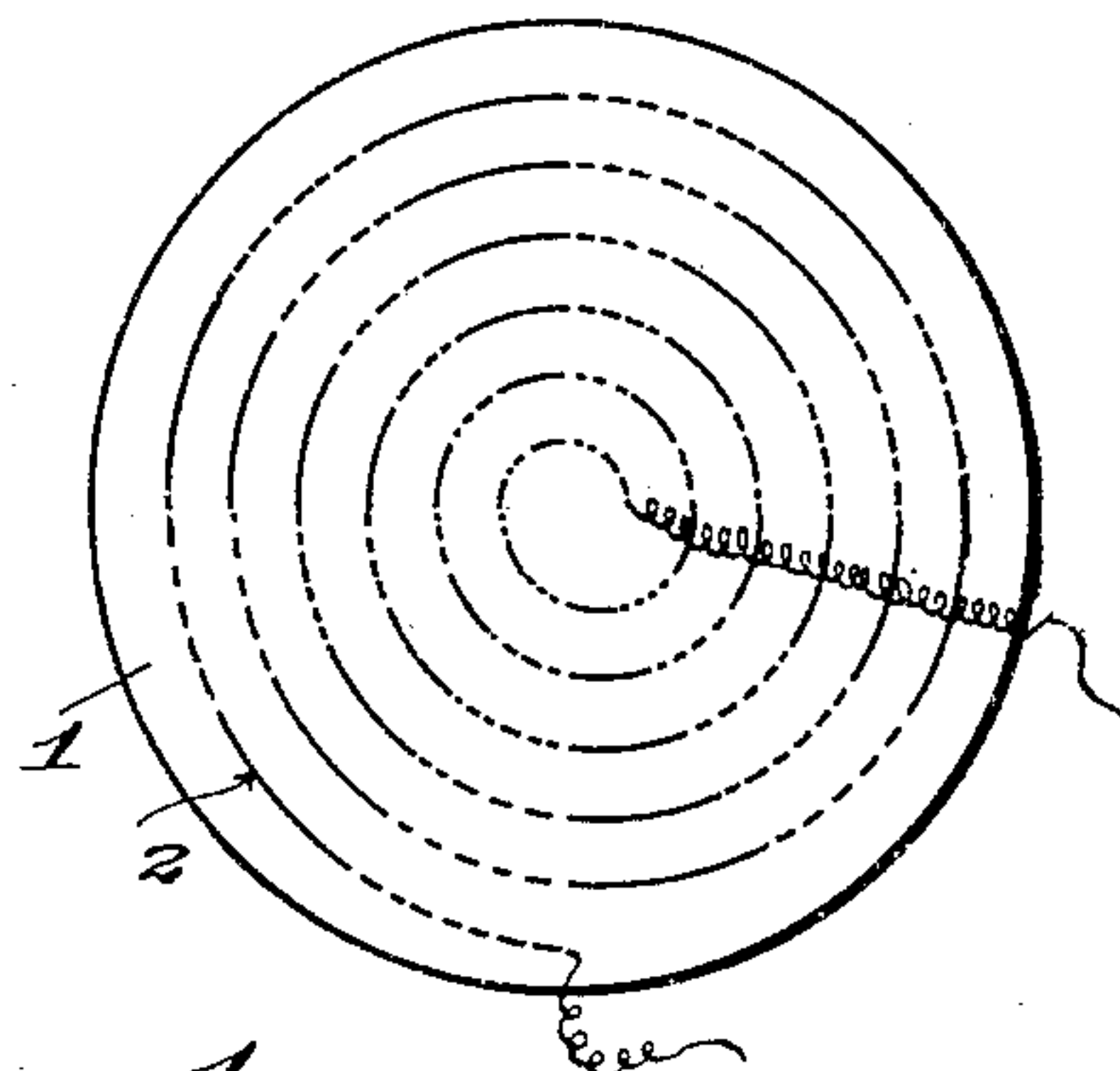
APPLICATION FILED SEPT. 9, 1903.

NO MODEL.

*Fig. I*



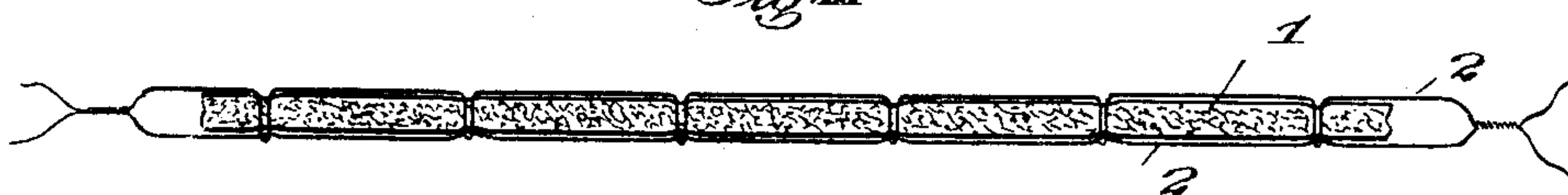
*Fig. IV*



*Fig. II*



*Fig. III*



Witnesses

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# UNITED STATES PATENT OFFICE.

GEORGE I. LEONARD, OF PASADENA, CALIFORNIA.

## RESISTANCE-SHEET FOR ELECTRIC HEATERS OR RHEOSTATS.

SPECIFICATION forming part of Letters Patent No. 768,764, dated August 30, 1904.

Application filed September 9, 1903. Serial No. 172,452. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE I. LEONARD, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Resistance-Sheet for Electric Heaters or Rheostats, of which the following is a specification.

Heretofore rheostats or heaters have been constructed by stretching resistance-wire in coils or by weaving it back and forth between pins or supports. In such a construction when a wire breaks, the wire being under tension, it snaps and becomes entangled with other wires and forms short circuits which cause a great deal of trouble and expense.

The main object of the present invention is to obviate this difficulty and to provide a resistance-sheet so constructed that the sheet itself may be held under a tension; but the current-carrying element is supported by the sheet in such a manner that if the current-carrying element burns out it does so quietly without interfering with any of the other sheets or parts of the heater.

Another object is to so combine the resistance-wire or other current-carrying element with the sheet that the sheet is uniformly heated throughout its entire area on both faces, so that the distribution of heat from the sheet is practically uniform at all points.

The accompanying drawings illustrate the invention, and referring to the same, Figure I is a perspective view of a rheostat or electric heater constructed with my improved resistance. Fig. II is a sectional view through the supporting-sheet, showing one manner in which the resistance-wire may be stitched therethrough. Fig. III is a view similar to Fig. II, showing another mode of stitching. Fig. IV is a plan view showing a disk form of sheet adapted for use in another form of heater or rheostat.

Briefly, the invention comprises a supporting medium, preferably in sheet form, and of an electrical non-conductor which is composed of some non-fusible material—such, for instance, as asbestos or mica—with resistance-wire stitched into or through the supporting medium.

In the drawings, 1 designates the support-

ing medium, which may consist of a thin sheet of asbestos or mica.

2 designates resistance-wire, which is stitched through the sheet either back and forth, as shown in Fig. I, or spirally, as shown in Fig. IV. The stitch may be either the lock-stitch shown in Fig. III, it may be a chain-stitch, or it may be the ordinary plain stitch, as shown in Fig. II. The stitches may be coarse or fine.

In Fig. I a series of rectangular sheets are shown held in a vertical position by supports 3, mounted on a base 4, and opposite ends of the wire, which is stitched through a sheet, are connected to metallic strips 5 on the edges of the sheets. The strips conduct the electric current from the supports 3 and also serve to stiffen the edges of the sheets. The supports 3 are preferably of a spring metal, so as to place the sheets under a tension sufficient to hold the sheets flatly.

The wire may be stitched back and forth, as shown in Fig. I, preferably with sufficient space between the rows to prevent arcing, and it is obvious that the wire could be stitched up and down in vertical rows on the sheet instead of lengthwise of the sheet, as shown. The wire is preferably sewn into the sheet with a sewing-machine just as one would stitch a thread with a sewing-machine through a piece of cloth. In this manner the wire is bent sharply at its junctions with the sheet and is stretched tight. The perforations through which the wire passes are in rows, and the perforations in a row are close together, and the wire is led from one perforation in a row directly to the adjacent perforation in the same row, and so on throughout the row. The wire then leaves that row and starts on another row, being passed through the perforations in each row serially. In other words, the perforations of a row serially receive the wire, thus forming a row of continuous stitches.

By reason of the wire being stitched so as to spread over the surface of the sheet the heat is prevented from concentrating, but is spread out and radiated in the most effective manner possible, which is advantageous whether the resistance is used for a rheostat



or for a heater. The wire is supported permanently in position by the sheet, and if a wire breaks or burns out the trouble is merely local and does not affect the rest of the heater, and the wires cannot possibly become tangled. Moreover, the wire itself is not under a tension, as it is the supporting-sheet which is stretched flatly, and if the wire burns out it does so quietly and without interfering with other parts.

The disk form of sheet shown in Fig. IV is designed especially for use between metallic substances to form disk heaters or other similar forms.

It is obvious that repairs may readily be made by substituting a new sheet in the event that the wires of the sheet burn through.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. Supporting means and a resistance material sewn with a row of continuous stitches into the supporting means.

2. A sheet of non-conducting material and resistance sewn with a row of continuous stitches into the sheet.

3. A sheet of non-fusible material and resistance sewn with a row of continuous stitches into the sheet.

4. A sheet of non-conducting, non-fusible material and resistance sewn with a row of continuous stitches into the sheet.

5. A sheet of asbestos and resistance-wire sewn with a row of continuous stitches through the sheet.

6. A sheet, and resistance-wire sewn with a plurality of rows each row being formed of continuous stitches.

7. An exposed sheet, and resistance material sewn through the sheet.

8. An exposed sheet, and a bare resistance-wire sewn through the sheet.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses, this 1st day of September, 1903, at Los Angeles, in the county of Los Angeles and State of California.

GEO. I. LEONARD.

Witnesses:

GEORGE T. HACKLEY,  
JULIA TOWNSEND.