

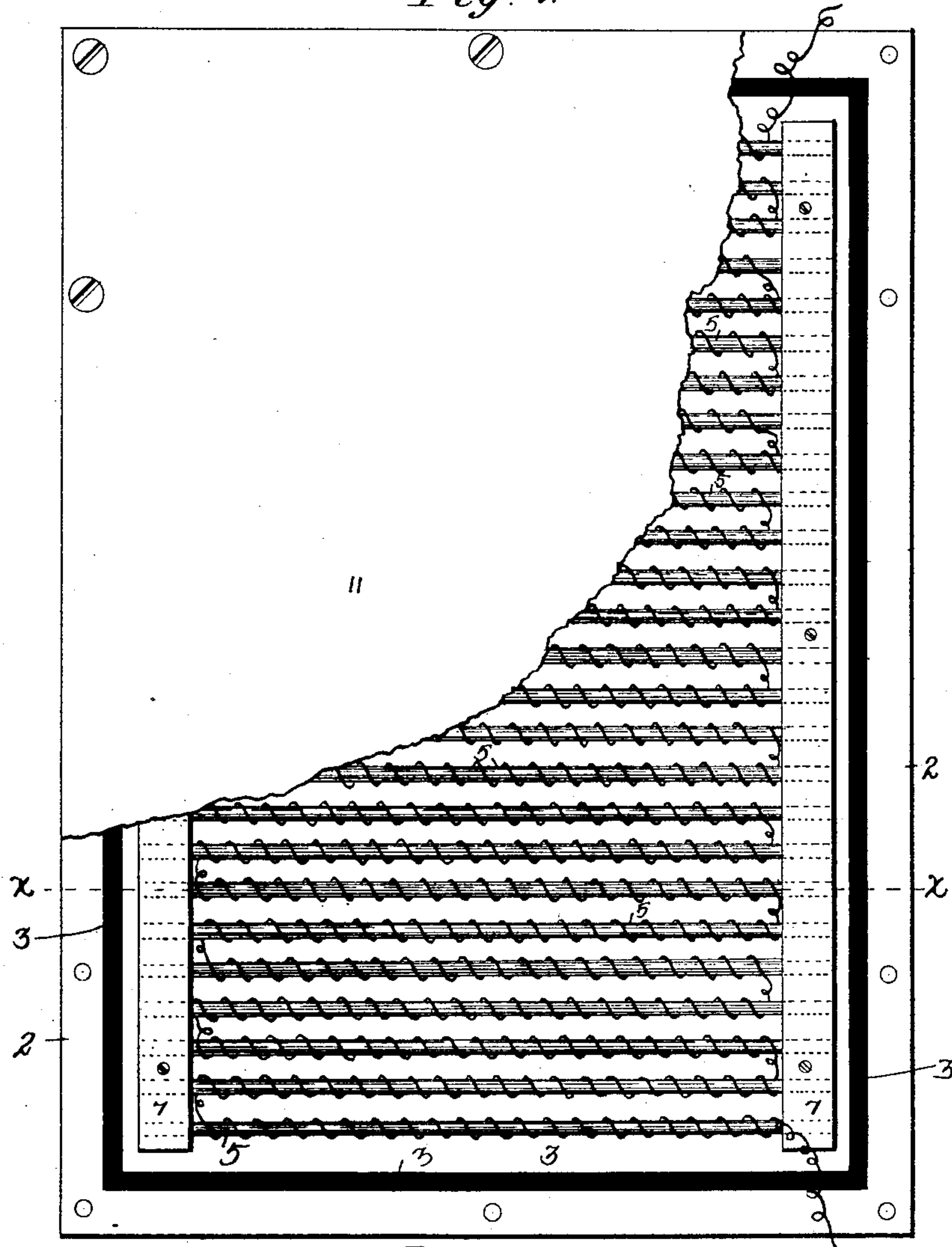
(No Model.)

C. W. DREW & E. R. FRANCIS.  
ELECTRIC HEATER.

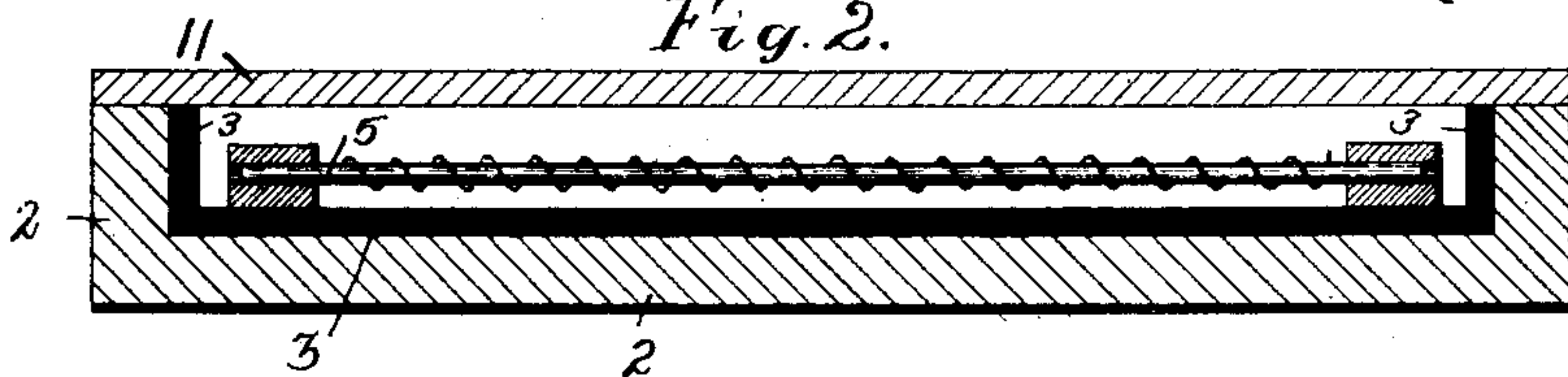
No. 426,437.

Patented Apr. 29, 1890.

*Fig. 1.*



*Fig. 2.*



Witnesses,  
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*J. Jensen.*

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*By Paul Merwin Allen*

# UNITED STATES PATENT OFFICE.

CHARLES W. DREW AND EDWARD R. FRANCIS, OF MINNEAPOLIS,  
MINNESOTA.

## ELECTRIC HEATER.

SPECIFICATION forming part of Letters Patent No. 426,437, dated April 29, 1890.

Application filed February 20, 1890. Serial No. 341,178. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES W. DREW and EDWARD R. FRANCIS, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Electric Heaters, of which the following is a specification.

The object of this invention is to provide improved means for utilizing an electric current for heating purposes.

The invention consists, generally, in providing a series of coils of resistant wire or metal supported upon strips or supports having a surface of insulating material and arranged within a suitable casing upon a base of electric insulating and non-heat-conducting material with a heating-plate arranged over but not in contact with said coils.

The invention consists, further, in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan view of our heater, with a portion of the upper plate broken away. Fig. 2 is a transverse section on line *x x* of Fig. 1, with the plate in position.

In the drawings, 2 represents a suitable casing, having a lining 3 of electric insulating and non-heat-conducting material, which forms a base upon which are supported the portions of the heater that are arranged within the casing. Within this casing, and secured upon said base, is a frame-work consisting of a series of rods 5 of electrical insulating material, or having the surface covered or coated with an electrical insulating material. These rods are supported in suitable bearings 7, that rest upon the base 3 and hold said rods above said base. An electric-resistance material, preferably in the

form of a wire or strip 8, is wound upon said rods extending spirally along one rod, then across to the next rod, and along that, and so on throughout the series. The ends of the wire are adapted to be connected to suitable conductors, through which the electric current is conducted to the heater.

Arranged over the coils of wire, and preferably in close proximity thereto, is a heating-plate 11, which is adapted to be heated by the heat radiated from the coils of resistant metal. The coils of resistant material are supported upon the insulated surface-rods, so as to be kept separated from each other and from the heating-plate.

The material forming the coil may be of any desired width and wound in any desired form.

We claim as our invention—

1. The combination, in an electric heater, of a suitable casing, an electric insulating and non-heat-conducting base arranged therein, supports having an insulating-surface arranged upon said base, coils of electric-resistance material, arranged upon said supports, and a heating-plate arranged over said coils, substantially as described.

2. The combination, in an electric heater, of a suitable casing, an electric insulating and non-heat-conducting base arranged therein, rods having an insulated surface supported upon said base, and coils of electric-resistance material, supported upon said rods, substantially as described.

In testimony whereof we have hereunto set our hands this 15th day of February, 1890.

CHARLES W. DREW.  
EDWARD R. FRANCIS.

In presence of—

A. M. GASKILL,  
S. W. ROBERTS.