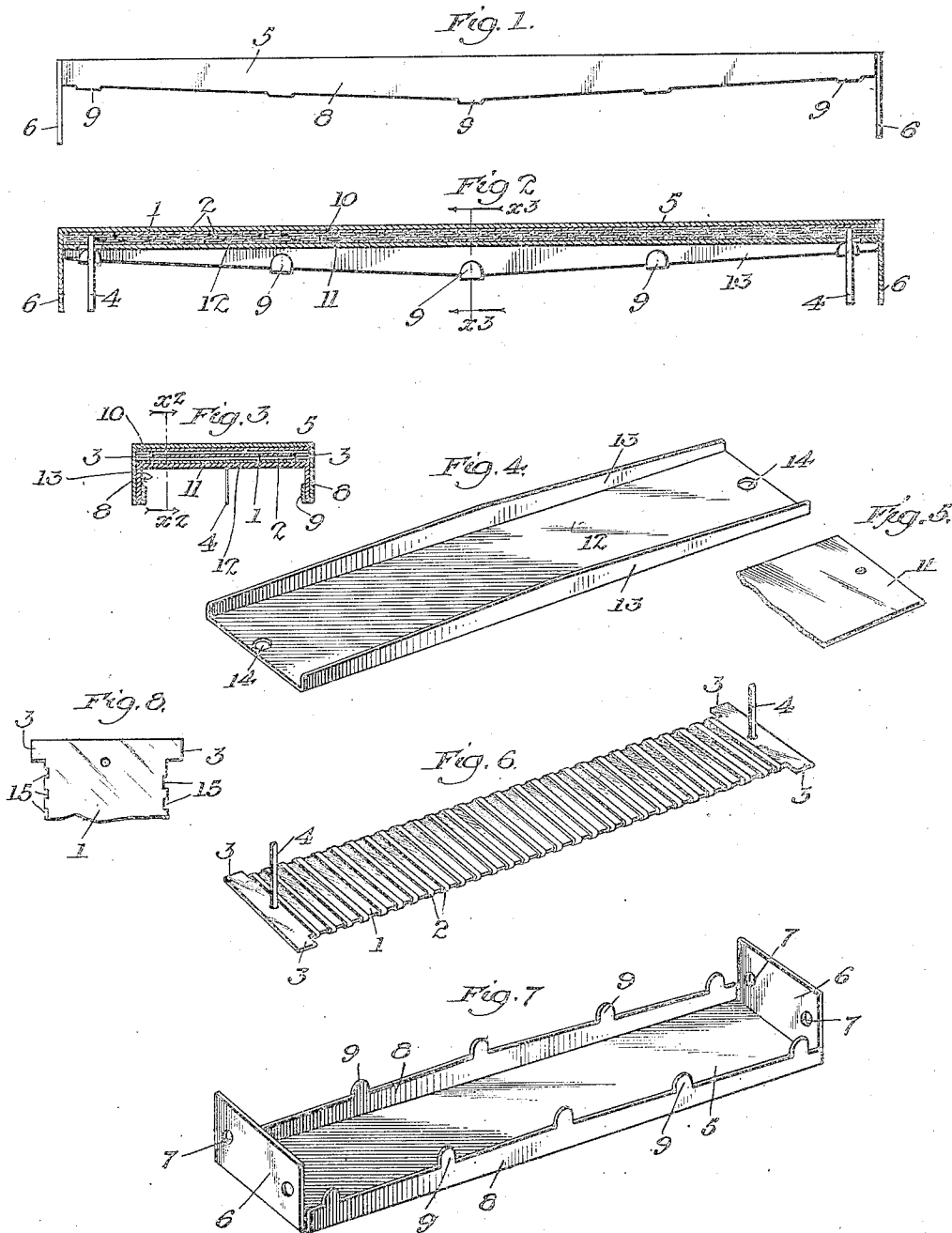


B. FALKENBERG.
ELECTRIC HEATING UNIT.
APPLICATION FILED MAY 27, 1912.

1,067,869.

Patented July 22, 1913.



Witnesses:
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UNITED STATES PATENT OFFICE.

BJARNE FALKENBERG, OF ONTARIO, CALIFORNIA, ASSIGNOR TO PACIFIC ELECTRIC HEATING COMPANY, OF ONTARIO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ELECTRIC HEATING UNIT.

1,067,869.

Specification of Letters Patent.

Patented July 22, 1913.

Application filed May 27, 1912. Serial No. 700,100.

To all whom it may concern:

Be it known that I, BJARNE FALKENBERG, a subject of the King of Norway, and having declared my intention of becoming a citizen of the United States, residing at Ontario, in the county of San Bernardino and State of California, have invented a new and useful Electric Heating Unit, of which the following is a specification.

This invention relates to electric heating units and the main object of the invention is to so construct the unit that it is self-contained and capable of operating as a single unit or of being assembled with one or more other units to form a heating surface of the required area.

A further object is to so construct the unit that when assembled in a series the units will lie close together and the actual area of the electric heating element underlie practically the entire external heating surface, whereby the external heating surface is uniformly heated.

A further object is to provide a unit that may be very economically constructed of pressed metal with fewest possible parts and with minimum thickness, thereby securing maximum heat delivery to the surface of the heater, and to provide a construction whereby there will be a minimum warping action.

Another object is to so construct the unit that the electrical element may be quickly removed and replaced if it becomes necessary.

A further object is to construct the electric element, consisting of the core and resistance wire, as a flexible element whereby it may yield in all directions and conform to any deviation from a plane surface.

Referring to the drawings:—Figure 1 is a side elevation of the device. Fig. 2 is a longitudinal section through the device on line x^2-x^2 Fig. 3. Fig. 3 is a section on line x^3-x^3 Fig. 2. Fig. 4 is a perspective of the retaining plate. Fig. 5 is a perspective view of a portion of one of the insulating sheets. Fig. 6 is a perspective of the electrical element, including the core on which it is wound. Fig. 7 is a perspective of the inverted outer plate. Fig. 8 is an elevation of a portion of the core of the electrical element.

The electric unit consists of a thin flexible sheet of mica 1 as shown in Fig. 6 wound

with resistance wire 2. At each end the mica sheet 1 has lateral lugs 3 which project beyond the wire 2 and each end of the mica sheet is perforated and the ends 4 of the wire extend therethrough. The electric element thus formed is perfectly flexible and capable of bending in all directions and lies within the outer plate 5 which has two downturned ends 6 with perforations 7 enabling attachment of the same to any supporting device desired and having depending side flanges 8 with lugs 9. A sheet of mica 10 lies next to the outer plate 5 to insulate the wire 2 therefrom and on the other side of the electric unit is a sheet of mica 11 which insulates the wire 2 from a retaining plate 12 which lies within the outer plate 5. The outer plate 5 and retaining plate 12 are both preferably formed of sheet metal and the retaining plate 12 has depending flanges 13. The flanges 8 of the outer plate and the flanges 13 of the retaining plate are both tapered toward each end, as clearly shown, for the purpose of stiffening the plates endwise and preventing warping. The lugs 9 of the outer plate are bent over the flanges 13 of the retaining plate and the latter is thus firmly held in position and holds the electric unit in close contact against the outer plate with only the intervening thin sheet of insulating mica between. The retaining plate 12 has comparatively large perforations 14 in its ends, each perforation permitting the adjacent wire end 4 to pass therethrough without coming in contact with the material forming the plate and thereby dispensing with insulation.

Whenever it is desired to replace the electric unit the lugs 9 may be bent back to release the retaining plate 12, whereupon the electric unit may be readily removed and replaced with a new one, after which the retaining plate is again placed in position and the lugs 9 bent back over the flanges 13.

The core 1 may be formed with notches in its side edges, which will engage the coils 2 and hold the coils in proper position, preventing any possibility of short circuiting, in addition to holding them uniformly spaced, giving a better distribution of heat.

The electric element being flexible, bends and accommodates itself to any departure from a plane surface of the walls between which it is confined.

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What I claim is:—

1. An electric heating unit comprising an outer plate of thin material with depending stiffening flanges, an electrical unit comprising a coil of resistance wire below said outer plate, and a retaining plate with depending stiffening flanges secured to the outer plate for holding said coil close against the outer plate.
2. An outer plate with depending flanges, a thin sheet of insulation with electrical resistance wound thereon beneath said plate, a retaining plate with depending flanges holding said sheet of insulation and electrical resistance close to the outer plate and means for securing said retaining plate in position.
3. An outer plate with depending flanges, each flange being tapered toward each end, an electrical resistance beneath said plate, a retaining plate with depending flanges lying beneath said resistance and means for holding said retaining plate in position.
4. An outer plate with downturned ends and with depending side flanges, electrical resistance below said plate, a retaining plate below said resistance and holding the same against said plate and means holding the retaining plate in position.
5. An outer plate with depending flanges having lugs, a retaining plate having depending flanges, said lugs being bent over the latter flanges, and electrical resistance between said retaining plate and the first plate.
6. An outer plate with depending flanges, a flat core of insulating material, wire wound on said core, said wire-wound core being below said plate, a sheet of insulation

on each side of the wire, a retaining plate below said wire-wound core and provided with orifices through which the wire passes, and lugs on the flanges of the outer plate bent over the flanges of the retaining plate.

7. An outer plate with depending flanges, a flat core of insulating material, wire wound on said core, said wire-wound core being below said plate, a sheet of insulation on each side of the wire, a retaining plate below said wire-wound core and provided with orifices through which the wire passes, and lugs on the flanges of the outer plate bent over the flanges of the retaining plate, the said outer plate having downturned ends which project below the side flanges of the outer plate.

8. An electric heating unit comprising a thin top plate formed with stiffening means, a retaining plate formed with stiffening means below the top plate, an electric resistance between said plates, and means for holding said plates and resistance close together.

9. An electric heating unit comprising two flat plates, a thin flat electrical resistance between said plates, and means detachably holding said plates closely against the resistance, the outer plate having depending end flanges which project below the other elements and support the unit.

In testimony whereof I have hereunto set my hand at Ontario, California, this 22nd day of April, 1912.

BJARNE FALKENBERG.

In presence of—

P. H. BOOTH,
FRANKLIN BOOTH.