(No Model.) 2 Sheets—Sheet 1.

J. V. CAPEK.

ELECTRICAL HEATING.

No. 395,950. Patented Jan. 8, 1889.

Fig. 1.

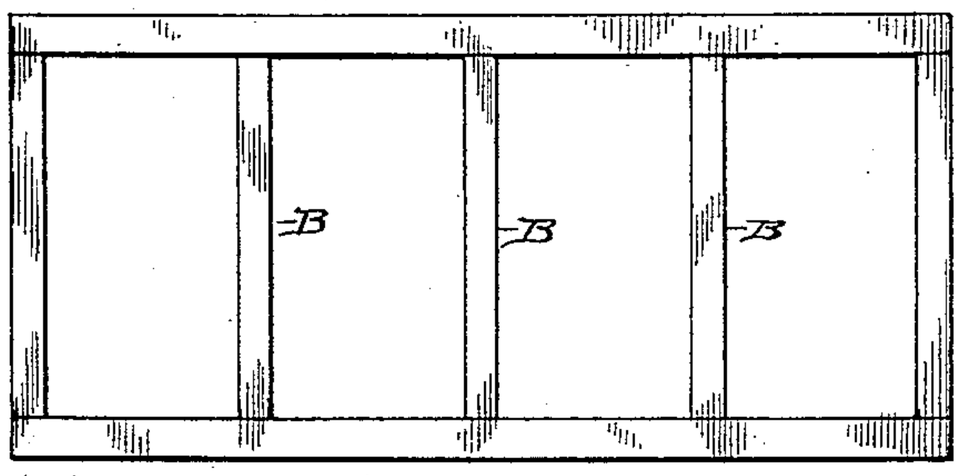


Fig. 2.

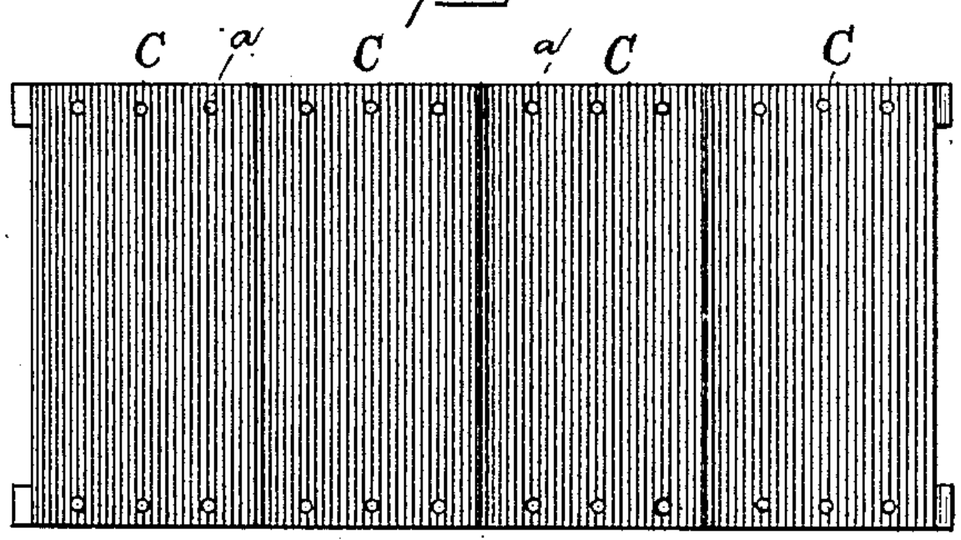


Fig. 3.

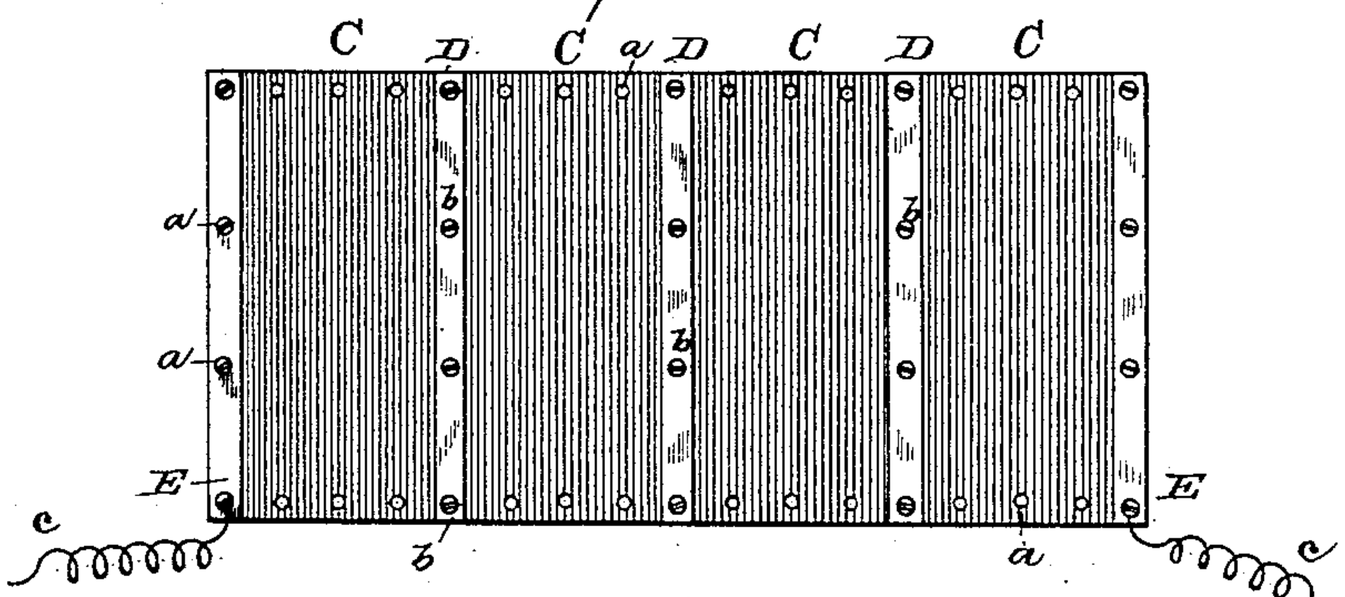


Fig. 5.

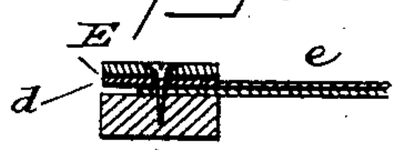
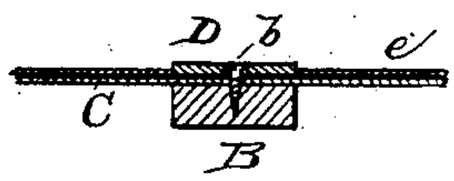


Fig. 4.



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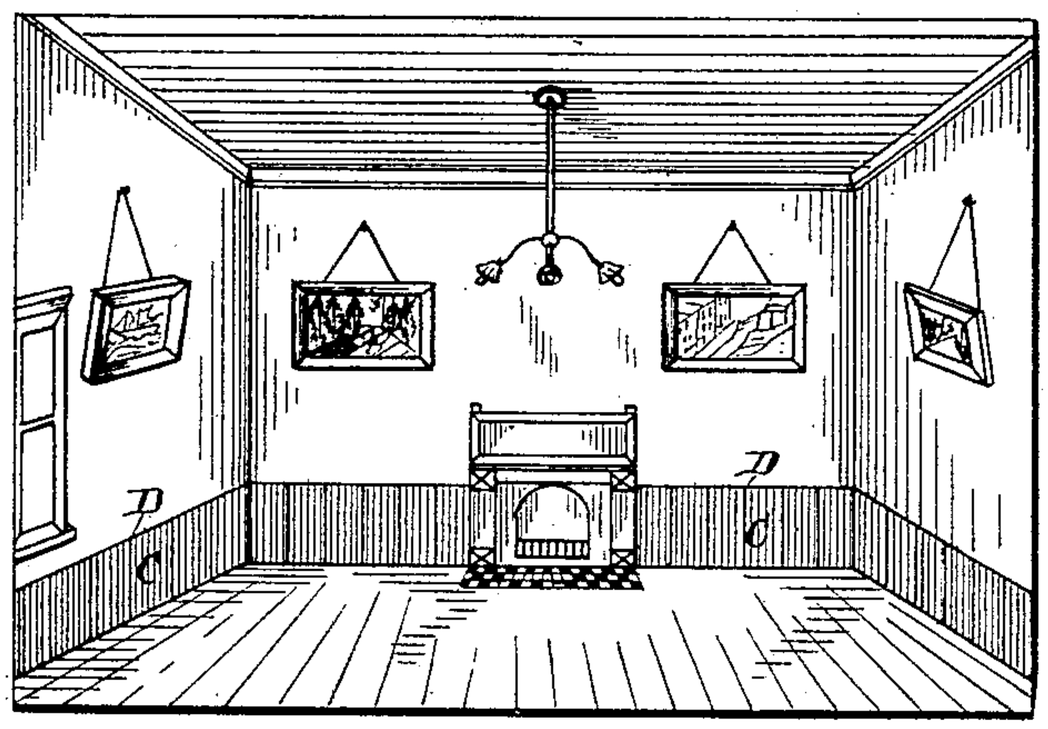
(No Model.) 2 Sheets—Sheet 2.

J. V. CAPEK.

ELECTRICAL HEATING.

No. 395,950. Patented Jan. 8, 1889.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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ELECTRICAL HEATING.

SPECIFICATION forming part of Letters Patent No. 395,950, dated January 8, 1889.

Application filed March 12, 1888. Serial No. 266,922. (No model.)

To all whom it may concern:

Be it known that I, JOHN V. CAPEK, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Electrical Heating, of which the following is a specification.

The object of my invention is to utilize electricity in a simple and effective manner for heating rooms and inclosed spaces.

Heretofore it has been attempted or proposed to accomplish this by the employment of electrical resistances of various kinds inclosed in chambers or cases and forming stoves or heaters placed in the room to be warmed. This has the disadvantage common to all modes of artificial heating hitherto used, that in it the heat is concentrated, and is therefore not effective, since parts of the room in the neighborhood of the heater must be heated to an undesirable extent in order that the more remote parts may be raised to the required temperature, and the resistances must be so highly heated for this purpose as to make it, as all artificial heating devices heretofore used are, a source of danger from setting fire to surrounding objects. In my invention I employ a very-widely extended heating-surface, preferably extending entirely around the room to be heated, whereby the heat will be equally diffused throughout the room. It is evident that if the walls of a room are equally heated at every part it will not be necessary that the temperature thereof shall be more than from 75° to 100° Fahrenheit in order that the whole room shall be comfortably heated. This idea of diffusing the heat over all the walls of a room enables me to employ as heating-resistances widely-spread very thin electrical conducting material placed upon or within the walls and connected with a source of electricity, so as to be heated by the current.

It is evident that if all the walls of a room were covered with a thin coating of carbon, which could be connected at terminal points in an electric circuit, such carbon would form a heating-resistance. This would embody the general principle of my invention.

In practice I employ strips or pieces of suitable insulating material covered with a thin coating of carbon, which strips are placed upon the walls of the room—so, for instance, as to form a wainscoting—the carbon being suitably protected from contact. A suitable number of such strips or plates are connected in multiple arc in series or in multiple series with the source of current, and they are thereby raised to the required temperature, which will always be less than the igniting-point of wood, paper, and similar combustible materials, and so will never be high enough to cause any danger of fire, the resistance and radiating surface of the carbon being so proportioned to the electro-motive force as to produce this effect.

The resistances may be made by coating a plate or strip of refractory material with a carbonaceous substance—such as a sugar solution—and then heating the same in a closed chamber, whereby an even deposit of carbon will be formed on the plate or strip, or the material may be heated in the presence of a hydrocarbon liquid or vapor whose carbon will be deposited on the heated body. I prefer, however, to employ the kind of carbon called "graphite" or "plumbago," which is very adhesive and has a high resistance both to electricity and heat. I coat pieces of heavy card-board or other suitable material with this substance. It may be readily applied by rubbing it in powdered form, either wet or dry, upon the non-conducting surface, which preferably is somewhat roughened, and will adhere thereto, forming a coating of high electrical resistance. These strips or plates are preferably attached to wooden frames secured to the wall, and suitable low-resistance terminals are provided for them.

Since the carbon would be rubbed off by handling and external contact, I prefer to cover it with paper, which may be the ordinary wall-paper or other suitable material—such as a proper paint or varnish.

A convenient construction embodying my invention is illustrated in the annexed drawings.

Figure 1 is an elevation of the resistance-supporting frame; Fig. 2, an elevation of the same with the graphitized plates upon it; Fig.

3, an elevation of the complete resistance-strip; Fig. 4, a cross-section of the same through one of the intermediate cross-bars of the frame; Fig. 5, a section through one of the terminal strips, and Fig. 6 a view of the interior of a room provided with my invention.

A is a frame, of wood or other suitable insulating material, having cross-pieces B B.

C C are strips of graphitized card-board or other insulating material covered thinly with carbon. A suitable number of these strips are laid upon the frame A with their edges meeting or nearly meeting at the cross-pieces B B, and are secured by screws or tacks at *a a*. Then at the meeting edges of the strips they are connected together by narrow conducting-strips D D, which are attached to the cross-pieces B B by screws or tacks *b b*. These strips D D may be of metal; but I prefer that they shall be strips of card-board graphitized on the under side somewhat more thickly than strips C C are graphitized, so that the connecting-strips are of greater conductivity than the resistance-strips. A suitable number of the strips C C being thus joined in series, the series is provided with low-resistance terminal strips E E, to which the circuit-wires *c c* are joined. These may be simply metal strips tacked or screwed to the end pieces of the frame. I prefer, however, to employ a thin metal strip, *d*, graphitized on both sides to prevent oxidation, and over this to place a strip of card-board graphitized on its under side. This leaves only insulating parts exposed, and if desired the attaching screws or tacks may have heads of insulating material, such as porcelain.

To protect the graphitized outer surfaces of the resistance-strips, I may cover them with paper, *e*, or similar material, or this covering may be of insulating paint or varnish, and the covering of paint or varnish may be bronzed, if desired.

The frames carrying the resistance-strips may be arranged in any suitable manner upon the walls of the room. In Fig. 6 they are shown as placed around the base of the walls, as a wainscoting. The whole wall-surface may, however, be covered with them, and the ceiling also, if desired, or any required portion of the walls, may be covered. The connection of the plates as to multiple arc and series will depend upon the current employed and the temperature required in each case—that is, if with a certain current it is found that the resistance of four strips connected in series, as shown in the drawings, will cause such strips to be raised to the required temperature, then all the strips in the room will be connected in series of four, each series being in multiple arc to the others, whereby all parts of the heating system will be raised to the same temperature.

It is evident that the heating-strips are not necessarily placed upon the walls, but that they may be suitably placed in other convenient situations—as, for instance, in the form of screens, folding or otherwise, which will stand upon the floor and may be moved from place to place if desired.

What I claim is—

1. In an electrical heater, a conducting body of little thickness and large surface provided with electrical circuit-connections, the resistance and radiating surface of such body being so proportioned to the current that such body is heated to a temperature below the igniting-point of wood, paper, and like combustible materials, substantially as set forth.

2. An electrical heater consisting of insulating strips or plates provided with thin coatings of carbon and electrical circuit-connections to said carbon, the resistance and radiating surface of said carbon being so proportioned to the current that said carbon is heated to a temperature below the igniting-point of wood, paper, and like combustible materials, substantially as set forth.

3. An electrical heater for rooms and inclosed spaces, consisting of a thin coating of electrical conducting material—such as carbon—placed upon the walls of the room and provided with electrical connections, the resistance and radiating surface of the conducting material being so proportioned to the current that said conducting material is heated to a temperature lower than the igniting-point of wood, paper, and like combustible materials, substantially as set forth.

4. An electrical heater consisting of one or more non-conducting strips or plates coated with carbon and a protecting-covering for the carbon and provided with electrical connections, substantially as set forth.

5. In an electrical heater, the combination of two or more non-conducting strips or plates coated with carbon, placed side by side, and electrically connected at their edges, substantially as set forth.

6. In an electrical heater, the combination of two or more non-conducting strips coated with carbon and united by conducting-strips laid upon their meeting edges, substantially as set forth.

7. An electrical heater consisting of strips or plates of graphitized card-board and electrical connections, the resistance and radiating surface of the carbon being so proportioned to the current that said carbon surfaces may be raised to a temperature below the igniting-point of the card-board, substantially as set forth.

8. In an electrical heater, the combination of an insulating-frame, plates or strips of insulating material coated with carbon secured to said frame, conducting-strips joining the meeting edges of the carbon-coated strips, and a protecting-covering for the carbon surface, substantially as set forth.

This specification signed and witnessed this 8th day of March, 1888.

JOHN V. CAPEK.

Witnesses:
T. A. MASON,
WILLIAM PELZER.