(No Model.)

M. W. DEWEY.

ELECTRIC HEATING APPARATUS.

No. 423,223. Patented Mar. 11, 1890.

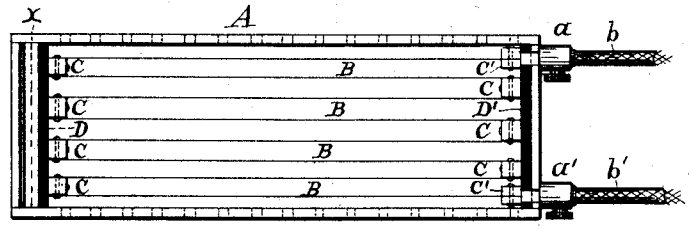


Fig. 1

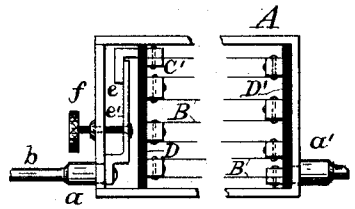


Fig. 5

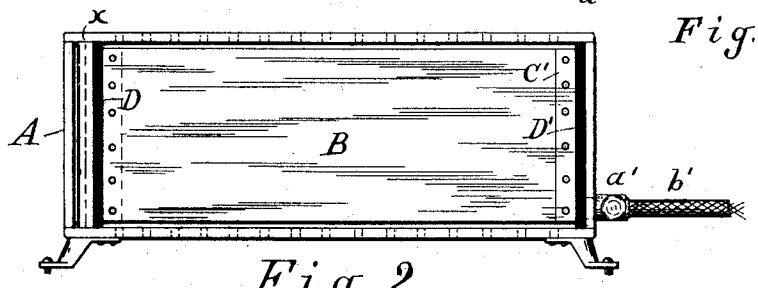


Fig. 2

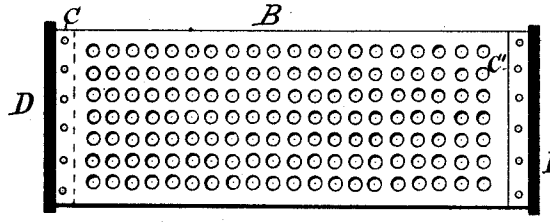


Fig. 3

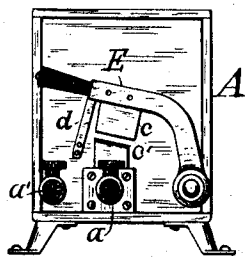


Fig. 4

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UNITED STATES PATENT OFFICE.

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ELECTRIC-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 423,223, dated March 11, 1890.

Application filed December 13, 1889. Serial No. 333,574. (No model.)

To all whom it may concern:

Be it known that I, MARK W. DEWEY, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Electric-Heating Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to electric-heating apparatus adapted for current or currents of large volume and for use in my systems of electric heating shown and described in United States Patents Nos. 401,482 and 406,890, dated, respectively, April 16, 1889, and July 16, 1889.

The object of my invention is to provide a simple and efficient heater that will expose a large radiating-surface and occupy a very small space, so that it may be placed in waste room, as under the seats in cars and other vehicles.

My invention consists, essentially, in the combination, with suitable supply-conductors, of a resistance or radiating device composed of thin flat sheets of metal, preferably iron, connected together in series; and it consists, further, in arranging the sheets parallel, side by side, and with air-spaces between them, and also arranging the heating device so that one end will have free movement longitudinally within the frame or case to allow for expansion and contraction due to heating by the passage therethrough of the electric currents and cooling upon the cessation of the currents. The said movement is utilized, as hereinafter referred to, to operate a suitable circuit maker and breaker to prevent undue heating of the device.

In the accompanying drawings, Figure 1 shows the plan view of the heater with the top plate of casing removed. Fig. 2 is a side elevation with the side plate of casing removed. Fig. 3 shows a perforated flat sheet of metal for a heater. Fig. 4 is an end elevation of a heater provided with a manual circuit maker and breaker; and Fig. 5 is a plan view similar to Fig. 1, but with the middle portion broken away, showing an adjustable automatic circuit maker and breaker.

Referring specifically to the drawings, A in the figures represents the frame or casing of the heater, which is constructed of either wood or metal and perforated on all sides, except the ends, to allow circulation of the air therethrough. Within the casing A, and extending longitudinally therein, are thin sheets of iron B, preferably ordinary sheet-iron, arranged parallel side by side, with air-spaces between them, and connected together in series by metal posts C, to which the sheets are riveted, soldered, or otherwise fastened. The sheets B are held an equal distance apart by said posts at each end of the device, and the posts are stayed and supported by non-conducting pieces D and D′, of terra-cotta or other suitable non-conducting material, to which pieces the said posts are secured. The non-conducting piece D′ is fastened to its end of the case A; but the other non-conducting piece D is left free to move toward and from its end of the case, or in a direction of the length of the sheets B, to allow for the expansion and contraction of the sheets when heated and cooled; otherwise if the sheets were placed quite close together they would bow and bend, touch each other, and short-circuit the current.

The dotted line *x* indicates the point to which the piece D will move when the sheets expand.

The posts C′, connected with the terminal sheets B, are connected to the binding-posts *a* and *a′* of the heater, and the supply-conductors *b* and *b′* are connected to said binding-posts.

The sheets B may be perforated in some cases to increase the resistance of the heater, as shown in Fig. 3.

On the end elevation (shown in Fig. 4) is a manual switch or circuit maker and breaker E. The same is shown in its open position between the points *c* and *c′*, and with a spring-catch *d* holding the same in this position, so that it will not be closed by the jolting of the car. The fulcrum of the switch-lever E is connected to one of the terminal posts C′.

The automatic circuit maker and breaker (represented in Fig. 5) is composed of a metallic hook *e* on the movable end of the device and connected to one of the posts C′, and a spring-plate *e′*, fixed at one end to the end and interior of the case A and connected to one of the binding-posts *a*. The free end of

the plate e' bears upon the inside of the hook e when the sheets B are not very hot; but when the temperature of the sheets has been raised sufficiently by the passage of the current therethrough the said sheets expand in length until the hook is separated from the plate, and the circuit through the heater is thereby broken and the current interrupted. The heater is then allowed to cool and contract until the circuit is again completed between the hook and spring-plate e', permitting again the passage therethrough of the current. An adjusting-screw f regulates and determines the extent to which the temperature of the heater is to be raised by varying the pressure of the spring-plate upon the hook.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a perforated flat sheet of metal, substantially as described.

2. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of perforated flat sheets of metal connected together in series, substantially as described.

3. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of perforated flat sheets of metal, substantially as described.

4. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of perforated parallel flat sheets of metal arranged side by side and connected together in series, substantially as described.

5. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal, substantially as described.

6. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal and non-conducting pieces to stay and support the posts, substantially as described.

7. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal, non-conducting pieces to stay and support the posts, and a suitable frame or case inclosing the device, substantially as described.

8. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal, non-conducting pieces to stay and support the posts, a suitable frame or case inclosing the device, and one end of the radiating device arranged to have free movement longitudinally within the case to allow for expansion and contraction due to heating by the passage therethrough of the electric current and cooling upon the cessation of the current, substantially as set forth.

9. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal, non-conducting pieces to stay and support the posts, a suitable frame or case inclosing the device, one end of the radiating device arranged to have free movement longitudinally within the case to allow for expansion and contraction due to heating by the passage therethrough of the electric current and cooling upon the cessation of the current, and a circuit maker and breaker adapted to be operated by said movement.

10. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, and connected together in series by posts of metal, non-conducting pieces to stay and support the posts, a suitable frame or case inclosing the device, one end of the radiating device arranged to have free movement longitudinally within the case to allow for expansion and contraction due to heating by the passage therethrough of the electric current and cooling upon the cessation of the current, and an adjustable circuit maker and breaker adapted to be operated by said movement.

11. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, a suitable frame or case inclosing the device, and one end of the radiating device arranged to have free movement longitudinally within the case to allow for expansion and contraction due to heating by the passage therethrough of the electric current and cooling upon the cessation of the current, substantially as set forth.

12. In an electric heater, the combination, with the supply-conductors, of a radiating device connected thereto, consisting of a plurality of parallel flat sheets of metal arranged side by side, with air-spaces between, a suitable frame or case inclosing the device, one end of the radiating device arranged to have free movement longitudinally within the case

to allow for expansion and contraction due to heating by the passage therethrough of the electric current and cooling upon the cessation of the current, and a circuit maker and breaker adapted to be operated by said movement.

In testimony whereof I have hereunto signed my name this 11th day of December, 1889.

MARK W. DEWEY. [L. S.]

Witnesses:
C. H. DUELL,
A. F. WALZ.