F. J. COOK.

ELECTRIC HEATING AND VENTILATING DEVICE.

APPLICATION FILED JUNE 27, 1913.

1,091,733.

Patented Mar. 31, 1914.

2 SHEETS—SHEET 1.

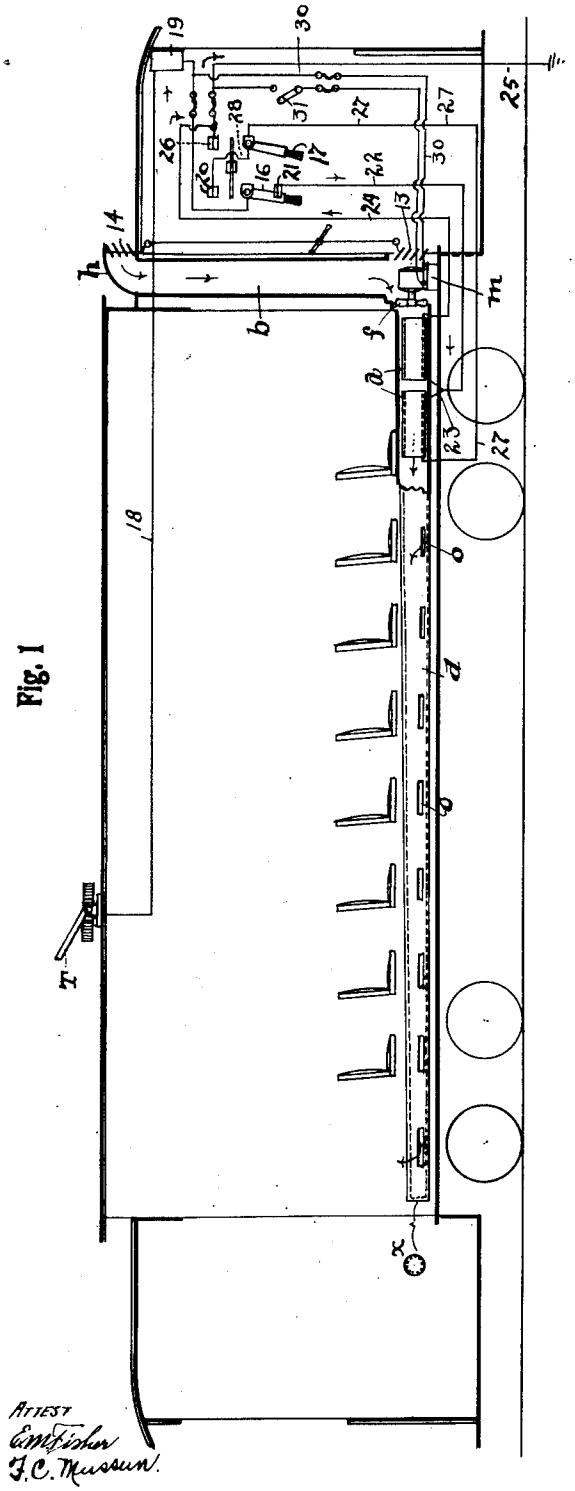

Fig. 1

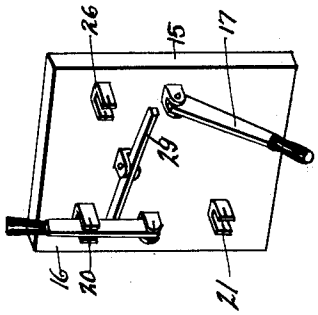

Fig. 3

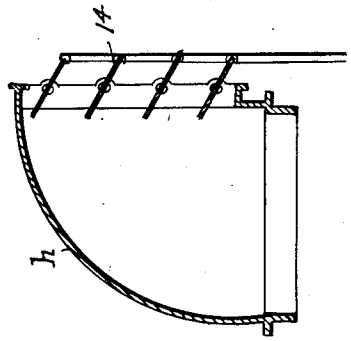

Fig. 2

ATTEST

Em. Fisher

F. C. Mussun.

INVENTOR

FRANK J. COOK

BY Fisher & Mussun ATTYS.

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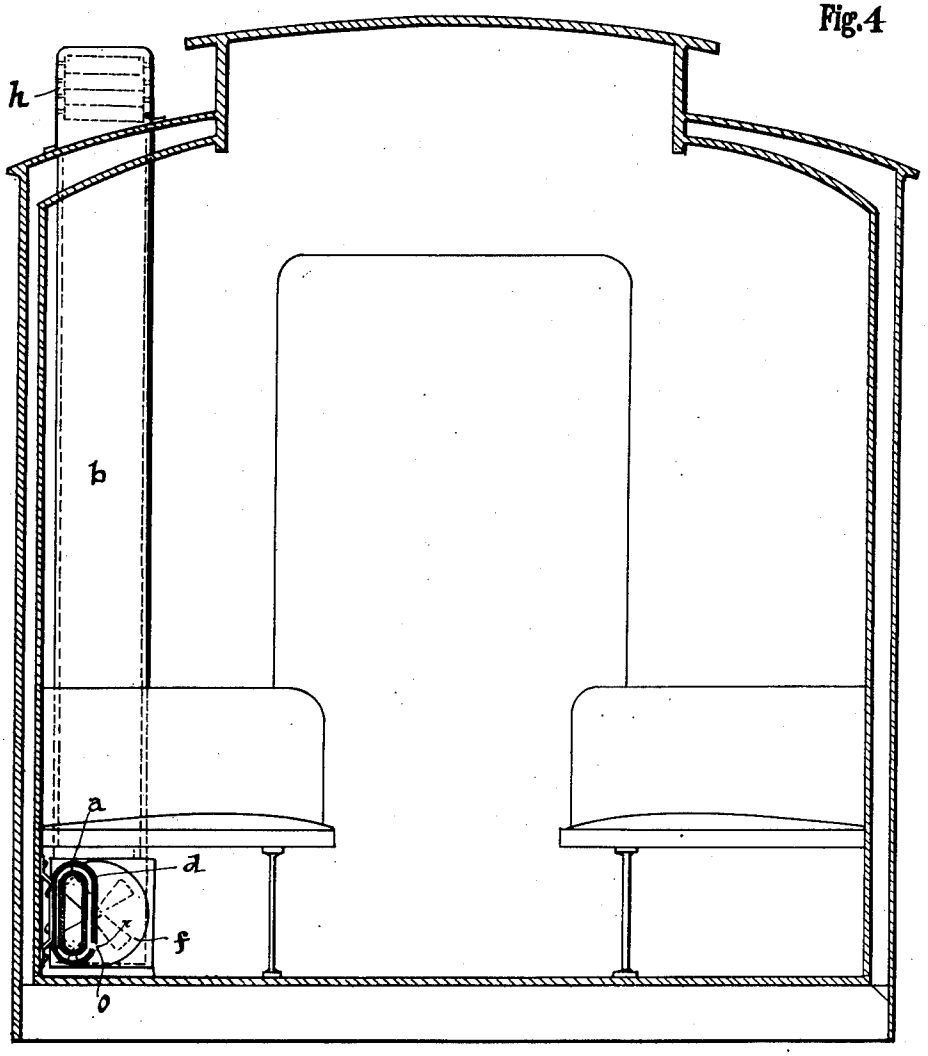
Fig. 4



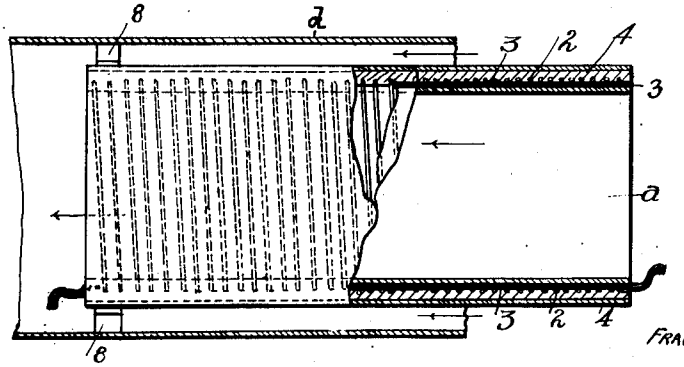


Fig. 5

ATTEST
Em Fisher
F. C. Mueseun

INVENTOR
FRANK J COOK

BY Fisher & Moore ATTYS.

UNITED STATES PATENT OFFICE.

FRANK J. COOK, OF CLEVELAND, OHIO, ASSIGNOR TO THE KONSRV ELECTRIC COMPANY, OF CLEVELAND, OHIO.

ELECTRIC HEATING AND VENTILATING DEVICE.

1,091,733. Specification of Letters Patent. Patented Mar. 31, 1914.

Application filed June 27, 1913. Serial No. 776,066.

To all whom it may concern:

Be it known that I, FRANK J. COOK, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Electric Heating and Ventilating Devices, of which the following is a specification.

This invention relates to electric heating and ventilating devices, for cars, coaches, steam boats and other places, all substantially as shown and described and particularly pointed out in the claim.

In the accompanying drawings Figure 1 is a side elevation of a trolley or like car more or less diagrammatic in outlines but serving to illustrate the construction and relation of the active parts of the invention as applied to cars. Fig. 2 is an enlarged sectional elevation of the hood of the fresh air duct from over the vestibule of the car to the heating and ventilating tube or conduit below. Fig. 3 is a perspective view, enlarged, of the switch plate and the levers thereon. Fig. 4, Sheet 2, is an enlarged cross section of a car showing my invention as installed upon one side thereof, Fig. 5 is an enlarged view partially in section at one end of one of the electric heating units or heaters employed herewith, as hereinafter fully described.

The invention as thus shown embodies a number of novel features, as I understand this art, comprising especially the tubular heating units or elements *a*, located directly in the heat conveying conduit or tube *d* and the air supply pipe *b*, adapted to supply fresh air from the outside of the car to said elements and conduit.

Minor features of the invention are associated with the foregoing, such as the dual air supply for conduit *d*, the switch mechanism for the electric current to the heating elements and the construction of the heating and ventilator conduit or tube as such.

Referring now particularly to the heating elements *a*, it will be observed that two are shown in the head of the conduit *d*, and one or more may be employed in each conduit according as more or less heat is wanted, and one or both may be placed in circuit and heated at the same time or one only be used. The said elements or units are round or oval in cross section to conform to the shape of the conduit *d*, whatever that may be. In the present case the said conduit is oval or oblong in cross section, and the said units or elements are of the same shape and adapted to be located therein, as seen in Fig. 1. The base or body of the said elements may consist of metal or tile or the equivalent of either, and which is thoroughly insulated from the electric windings thereon by suitable layers 3 of asbestos, mica or other non-conducting or insulating material. The said electric winding or resistance wire or coil 2 is wound upon or about the said insulation 3, and a coat 4 of powdered soap stone of a depth or thickness of about one eighth to one fourth of an inch, more or less, is placed about or over said wire. The said coat is bound by an adhesive like plaster of Paris, or its equivalent, and adapted to hold the wire in place as well as to form a thorough outside insulation to conserve the heat within the tube.

Obviously with the foregoing construction the heat of resistance in the coil 2 is imparted both within and without the element and the inflowing air will absorb the same and convey the heat along within conduit *d* to the farthest end thereof. The volume of heat generated in the said elements will of course vary according to the volume of current, the amount of resistance and other conditions, but not infrequently in cold weather the entire element will become cherry red and remain so indefinitely when operated under a suitably high pressure. The conduit *d* is shown as having both the heating elements in the head or larger end thereof and current connections therewith will presently be traced. The said conduit is not only oblong in cross section for the most part but gradually tapers its entire length and is provided with slots or openings *o* at intervals between its end for discharge of the heated air into the car. The said tube or duct is preferably located beneath the seats and the side of the car, and the construction thereof with respect to both the taper and the series of openings *o* is such as to deliver the heated air as uniformly as possible the full length thereof and with substantially the same total of heat units issuing out of each and every slot. Of course it will follow that the temperature of the air will decrease with the distance from the heating elements, and therefore the slots *o* are of gradually increased size or area in proportion to the decrease in temperature, thus making up in volume what is lacking in actual heat value,

as compared with the slots nearest to the source of heat. Furthermore, the oblong shape or cross section of the conduit *d* gradually runs to a complete round or circle at its reduced and closed end, as indicated at *x*, within the bracket at the rear of Fig. 1. Of course I might continue the oblong form to the extremity of the conduit, but owing to its reduction to comparatively small size at said extremity the flow of air is materially promoted by the gradual change to a cylindrical form. I might also make the entire tube cylindrical but better results are obtained by the present construction.

The heating elements are spaced apart from the wall of the said conduit by any suitable means as seen at 8, Fig. 5, and are constructed to offer the least possible resistance to the movement of air in or through the conduit and to heat the air to the desired temperature with the least possible consumption of the electric current. Hence the said elements are made tubular with comparatively thin walls, and a blower or fan *f* is placed at the mouth of conduit *d* next in advance of said elements and is driven by a motor *m* having the said fan mounted on the shaft thereof or by any other available source of power. A suitable box or space at the bottom of the air duct or passage *b* serves as a housing for said motor and fan, and window blind slats 13 at the front of said box open into the vestibule of the car and enable air to be taken therefrom for supply to the duct *d*, as in excessively cold weather, or these slats can be closed and the air be taken exclusively through down passage *b* from the outside and from over the vestibule where a specially constructed hood *h*, Fig. 2, provides air supply. The said hood has a square front with window slats 14 adapted to open and close the air passage *b*, and the said slats may be connected for joint operation with the slats 13 below or either may be opened and closed separately. The slats 14 serve especially to keep out rain and snow and also entirely close this passage when desired.

By the use of two electric heating elements of the kind described I can obtain variable heating effects to meet changeable conditions of the weather, and this I accomplish by electrically connecting the said elements as follows: Beginning at the trolley T a wire connection 18 leads therefrom to the usual breaker 19 in the vestibule of the car and thence to switch lever 16 which is adapted to engage with either of the contacts 20 or 21, on the switch board 15. Contact 21 has a wire connection 22 with the terminal connection 23 between the two elements *a*, and the front element has a wire connection 24 leading to the ground wire 25 which connects with a third contact 26 on switch board 15. Contact 26 is adapted to be engaged by the other switch lever 17 which is connected by wire 27 to the rear element *a*, and a cross connection 28 between lever 17 and contact 20 completes the wiring for the electric heating elements. By referring to Fig. 1, it will be seen that only the front heating element *a* is in the electric circuit, thereby yielding the medium heating results to be obtained from the device. Now, assuming that a lower heat is desired, both elements *a* may be placed in the electric circuit in series by throwing lever 16 out of engagement with contact 21 and into engagement with contact 20. A higher or more intense heat can be obtained by placing elements *a* in the electric circuit in parallel, which is accomplished by throwing lever 17 into engagement with contact 26 and lever 16 in circuit with contact 21; and to positively prevent a short circuit the said levers are pivotally mounted side by side on the switch board 15 with a tilting member 29 at an intermediate point, whereby when either lever is thrown upwardly to close a circuit the other lever will be forcibly disengaged with its contact, if it happens to be so set and related. The control of fan motor *m* is by a separate line of connections 30 embodying a switch 31.

What I claim is:

In electric heaters for cars and the like, a conduit extending substantially the full length of the car and tapered from its intake end to its opposite end and oblong in cross section at its intake end and round at its opposite end and provided with escape openings at intervals gradually increased in size from its intake to the opposite end, a blower at said intake end and an air supply duct to the mouth of said intake next in advance of said blower, in combination with electric heaters located within the intake end thereof.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK J. COOK.

Witnesses:
R. B. MOSER,
F. C. MUSSUN.