W. I. THOMSON.

ELECTRICAL STEAM GENERATOR.

APPLICATION FILED JULY 23, 1909.

1,148,808.

Patented Aug. 3, 1915.

2 SHEETS—SHEET 1.

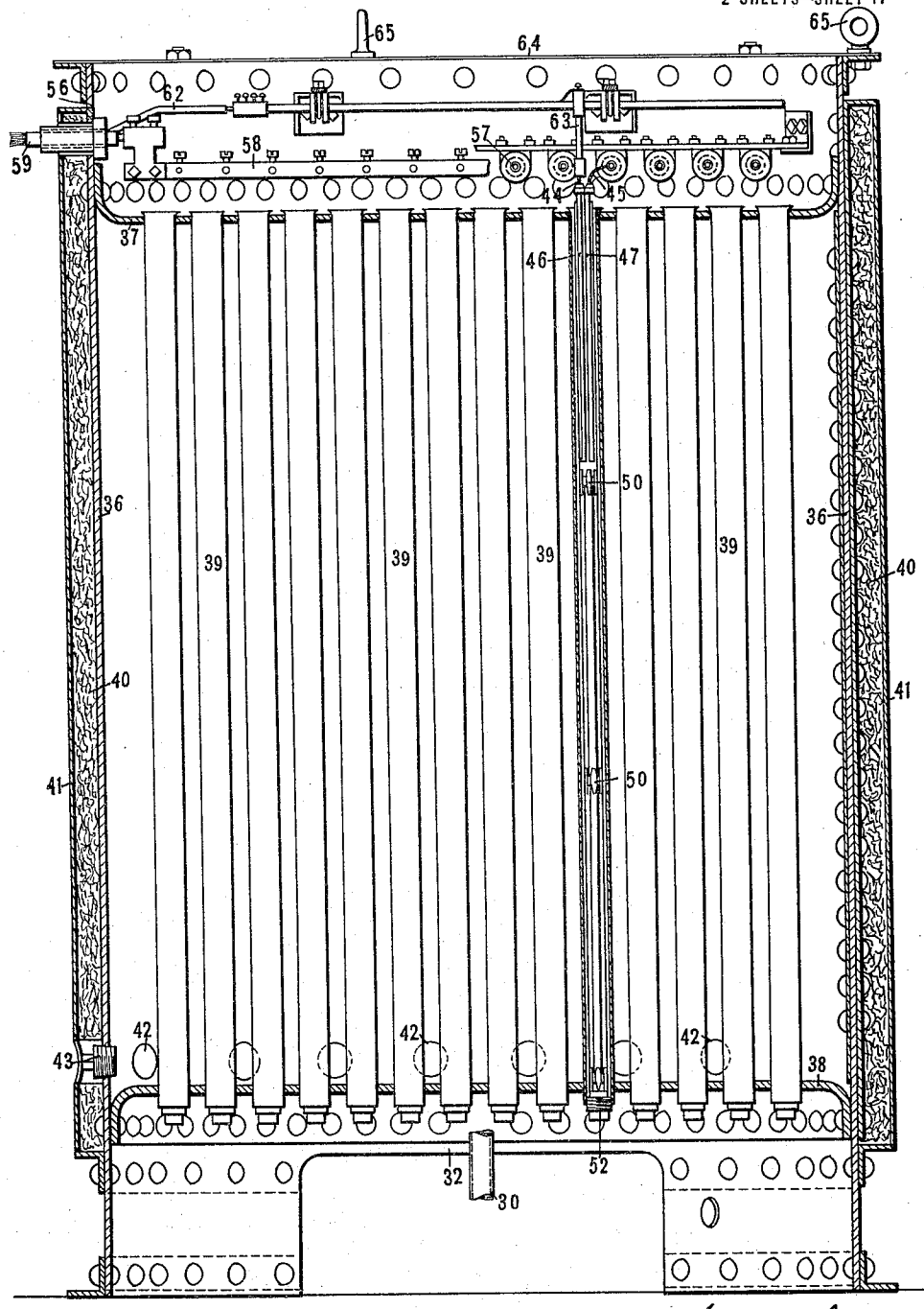


Fig. 1.

WITNESSES

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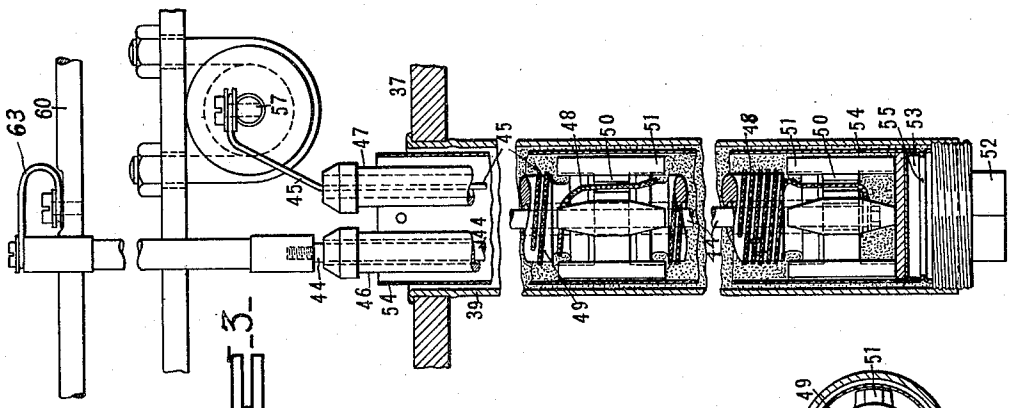


FIG. 3.

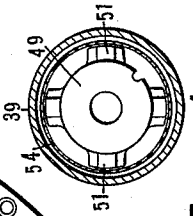


FIG. 4.

FIG. 2.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM I. THOMSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO SAFETY CAR HEATING & LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

ELECTRICAL STEAM-GENERATOR.

1,148,808. Specification of Letters Patent. Patented Aug. 3, 1915.

Application filed July 23, 1909. Serial No. 509,169.

To all whom it may concern:

Be it known that I, WILLIAM I. THOMSON, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electrical Steam-Generators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in electric heating appartus, and more particularly to apparatus of this character adapted to be employed in the heating of cars and the like.

One of the objects is to provide an efficient, practical, and compact apparatus for utilizing the heating effect of an electric current.

Another object is to provide a device of this general type in which the current carrying members will be protected against any leakage of water which may occur within the generator.

Another object is to provide a device of this character in which the individual current carrying members may be easily and quickly removed without in any way disturbing the operation of the generator.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is illustrated one of various possible embodiments of the invention, Figure 1 is a vertical sectional view of the generator; Fig. 2 is a detail plan view of the same, the cover being removed; Fig. 3 is an enlarged sectional view of one of the heating tubes and associated parts; and Fig. 4 is a sectional view of the same showing the position of a spacing member within the tube, parts being omitted for the sake of clearness.

Similar reference characters refer to similar parts throughout the several views.

As tending to render more readily understood certain features of this invention, it may here be noted that it has been found desirable, under certain running conditions, to substitute electric for fuel-burning locomotives. As the trains must be heated when being drawn by either type of locomotive, it has been found advisable to install upon the electric locomotive a steam generator operated by electrical energy to be used in conjunction with the heating system of the train, in order to avoid the expense incident to the installation of electrical heating apparatus therein. In apparatus of this type there is danger of short-circuiting of the electrical conductors due to portions of the steam generator becoming broken or corroded, thereby allowing water to flow into the space occupied by the conductors. This objectionable feature, among others, is obviated in the construction hereinafter described.

Certain features shown in this application are shown, described and claimed in the application of William I. Thomson and Harrison G. Thompson, filed January 11, 1907, and bearing Serial No. 351,836, to which reference is made for a more detailed description thereof.

Referring now to the figures, there is shown a shell 36 having mounted therein upper and lower heads 37 and 38 within which vertical heating tubes 39 are expanded in the usual manner. Shell 36 is surrounded by any suitable heat insulating material 40 which may be maintained in position by an outer or supplementary shell 41. Openings 42 are preferably provided in the shell 36 at its lower portion which are normally closed by removable plugs 43 upon the removal of which access may be had to the interior of the generator for cleaning purposes.

Within each of the heating tubes 39 are led a pair of conductors 44 and 45 connected as hereinafter described and passing preferably through porcelain tubes 46 and 47 to a point below the water line of the gen-

erator. From this point one of the conductors 45 is connected to a high resistance wire 48 coiled about a tube 49 formed of insulating material such as porcelain, and the outer surface of the coil is preferably enameled in order to minimize any danger of short-circuiting. As shown, there are a plurality of coils placed end to end within the tube and separated from one another by suitable separating elements 50 comprising upwardly and downwardly extending arms 51 adapted to embrace the ends of the tubes to hold them in position. At the lowermost end a connection is made between the coils and the conductor 44 which conductor passes through the interior of the tubes.

At the lower end of each tube 39 there is provided a removable closure 52 which in the embodiment shown consists of a plug provided with a threaded portion engaging the lower end of the tube. A bottom member 53 is provided to fit within the lower end of the tubular casing 54 which is positioned within the tube 39 surrounding the heating element above described, and which preferably extends above the upper end of the tube as plainly indicated in Fig. 3. A suitable bead 55 is rolled in the tube 54 to keep the bottom member 53 in place. The heating elements are then slipped inside the tubular casing 54 and the tube filled with a heat conducting material, preferably white quartz sand, which not only performs the above function but, also, acts as an electrical insulator thereby reducing the danger of any short-circuiting. The casing is preferably constructed of material impervious to water, such as brass, and it will be seen that a water tight compartment is provided within which the electrical heating member and sand is located.

It will be evident from the above description that the tube and the inner casing, when so constructed and assembled, will provide an extremely efficient protection for the electrical conductors contained therein, for, if the heating tube should become cracked or corroded, thereby permitting water to pass into its interior, the casing 54 will effectually prevent the water from coming into contact with the electrical conductor, the water being compelled to remain between the tube and the casing. If for any reason it is desired to remove the heating member, it is merely necessary to remove the plug 52, after which the heating member may be withdrawn, the conductors 44 and 45 having been first disconnected from their respective feeding conductors, hereinafter described.

The shell 36 is preferably extended above the head 37, as indicated at 56, and within this extended portion a number of substantially parallel bus-bars 57 are supported, these bus-bars being connected with the several conductors 45 leading from the various heating members and being connected to a main feeding bar 58 which in turn is connected to one of the feeding terminals 59. Extending across the generator in another direction and also parallel with one another and to the rows in which the heating elements are disposed, are bus-bars 60 which are connected with the conductors 44 of the various heating elements. In the embodiment shown these bus-bars are connected in pairs by means of a connecting strip 61, each pair being provided with a terminal 62 which leads without the shell to a switch-panel provided with suitable switches, not shown, for throwing into circuit one or more of the pairs of bus-bars as desired. The last described bus-bars are located in another plane from the first mentioned bus-bars, thereby avoiding all danger of short circuits, and permitting access to the various connections.

As shown in Fig. 3, a fuse 63 preferably of the no-arc type is interposed between the bus-bars 60 and the conductors 44 associated therewith and with each of the heating elements.

The upper end of the shell is provided with a cover 64 removably secured thereto by a suitable retaining means, such as the eye-bolts 65, thereby preventing any water or other foreign matter from entering the space within which the bus-bars and the various electrical connections are positioned, while permitting access to the same when desired.

The operation and method of use of the above described apparatus is substantially as follows: Assuming an electric locomotive to be connected to the train in the usual manner, any desired number of heating tubes within the generator are thrown into circuit, whereby the generator may be caused to steam at any desired rate to accord with the temperature conditions. Upon current passing through the conductors located within the tubes, steam will be generated which may be supplied to the cars in which it may act either directly or indirectly as a source of heat radiation. Should any break occur in any one of the tubes, there will be no necessity for shutting down the generator, as the casing 54 within the leaking tube will effectually prevent any water from coming into contact with the electrical conductors.

It will thus be seen that there is provided apparatus which accomplishes the objects above set forth, as well as others, and that on account of its extreme compactness it may be installed in an electric locomotive without any undue sacrifice of space.

As many changes could be made in the above construction and many apparently widely different embodiments of this inven-

tion could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In apparatus of the class described, in combination, a heating tube, electric current-utilizing means within said tube and adapted to generate heat therein, a core on which said means are mounted, and means for preventing water which may be admitted within said tube from having access to said first-mentioned means.

2. In apparatus of the class described, in combination, a receptacle adapted to contain water, a heating tube therein, electric current-utilizing means within said tube and adapted to generate heat therein, a core around which said means are wound, a casing, formed to exclude water, disposed within said tube and surrounding said means, and heat-conducting means between said first means and said casing and between said casing and said tube.

3. In apparatus of the class described, in combination, a receptacle adapted to contain water, a heating tube therein, electric current-utilizing means within said tube and adapted to generate heat therein, and a water-tight compartment within said tube and within which said means is positioned.

4. In apparatus of the class described, in combination, a boiler, a heating tube secured thereto, a heating unit electrically insulated from and positioned within said tube, a water-tight casing protecting said unit, and positioned between the unit and the tube, and means permitting said unit and casing to be withdrawn bodily through one end of said tube.

5. In apparatus of the class described, in combination, a heating tube, electric current-utilizing means within said tube and adapted to generate heat therein, a tubular casing within said tube and surrounding said means, a plug removably engaging one end of said tube, and separate means for closing one end of said casing.

6. In apparatus of the class described, in combination, a receptacle adapted to contain water, a heating tube therein, electric current-utilizing means within said tube and adapted to generate heat therein, and a tubular member within said tube and surrounding said means, means for closing one end of said tube, and means for closing one end of said casing, the other end of said casing extending beyond the other end of said tube.

7. In apparatus of the class described, in combination, a boiler, a tubular member therein, a second tubular member of insulating material in said first member, a conductor passing centrally therethrough and thence coiled about the exterior surface thereof, a third tubular member between said first mentioned members formed to exclude water from said conductor, and granular heat conducting material between said second and third tubular members.

8. In apparatus of the class described, in combination, a boiler, a tubular member therein, a second tubular member of insulating material in said first member, a conductor passing centrally therethrough and thence coiled about the exterior surface thereof, a third tubular member between said first mentioned members, granular heat conducting material between said second and third tubular members, and a removable closure for permitting the removal of the inner tubular members and conductors.

9. In apparatus of the class described, in combination, a tubular member, a second tubular member of insulating material in said first member, a conductor passing centrally therethrough and thence coiled about the exterior surface thereof, a third tubular member between said first mentioned members whereby said third tubular member and the elements therein contained may be withdrawn as a unit, and granular heat conducting material between said second and third tubular members.

10. In apparatus of the class described, in combination, a boiler, a tubular member therein, a second tubular member of insulating material in said first member, a conductor passing centrally therethrough and thence coiled about the exterior surface thereof, and a removable cover for permitting the removal of the inner tubular member and conductor.

11. In apparatus of the class described, in combination, a tubular member, a second tubular member of insulating material in said first member, a conductor passing centrally therethrough and thence coiled about the exterior surface thereof, a third tubular member between said first mentioned members and adapted to exclude water from said conductor, granular heat conducting material between said second and third tubular members, and a removable closure for permitting the removal of the inner tubular members and conductors.

12. In apparatus of the class described, in combination, a boiler, a tubular member screw-threaded adjacent one end, a heating

unit comprising a second tubular member, a conductor passing therethrough and thence coiled around the exterior surface thereof, and insulating material between said coils and said first tubular member, and means comprising a threaded cap adapted to cooperate with the threaded end of said first tubular member for removably retaining said heating unit in operative position within said first tubular member.

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

WILLIAM I. THOMSON.

Witnesses:
E. E. ALLBEE,
ROYAL W. FRANCE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."