R. M. DIXON.

HEATING SYSTEM.

APPLICATION FILED OCT. 4, 1906.

965,283.

Patented July 26, 1910.

2 SHEETS—SHEET 1.

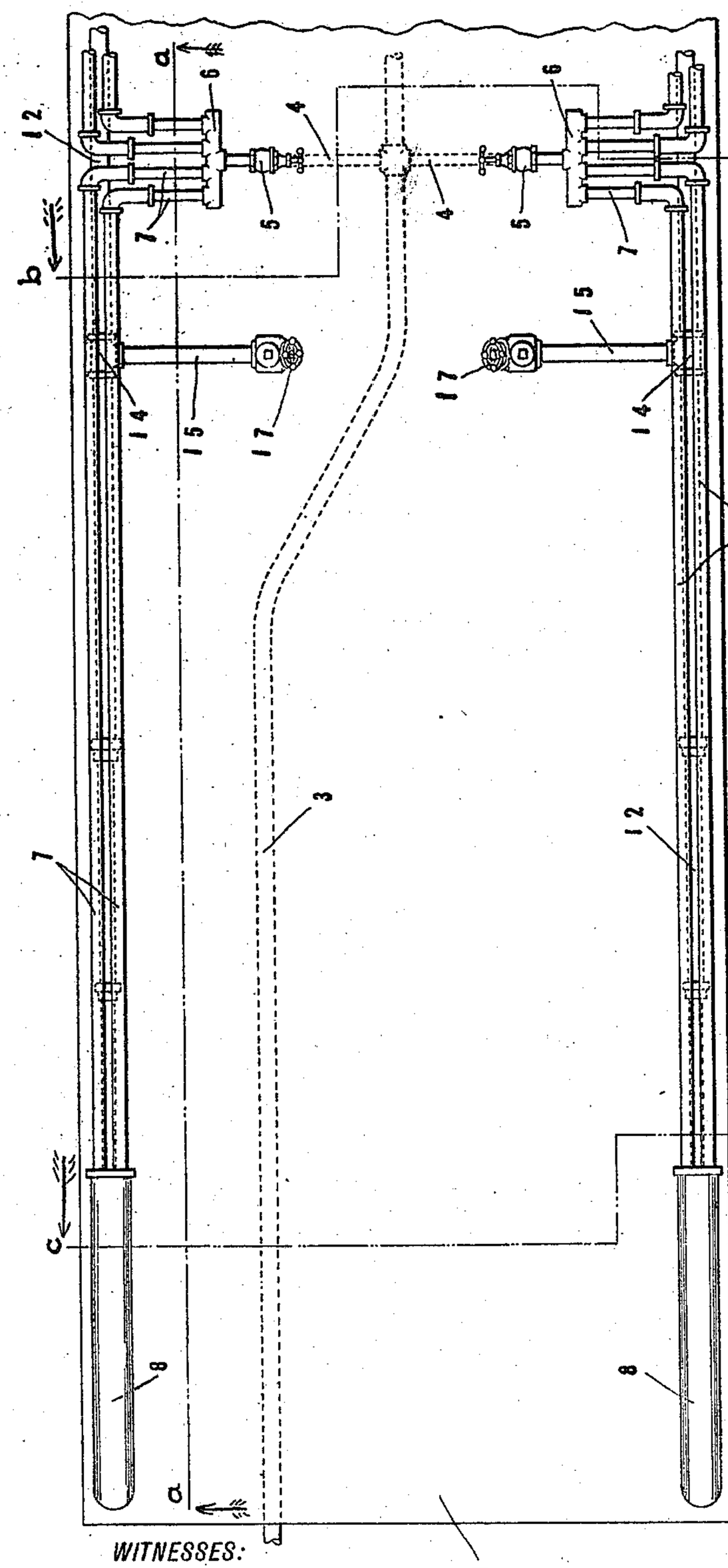

Fig. 1.

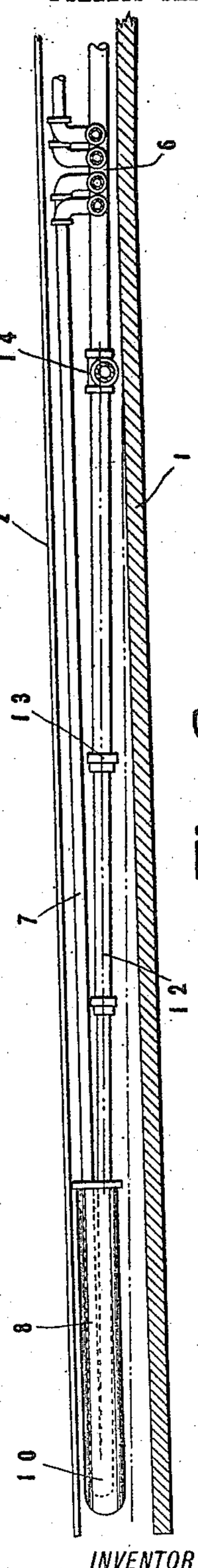

Fig. 2.

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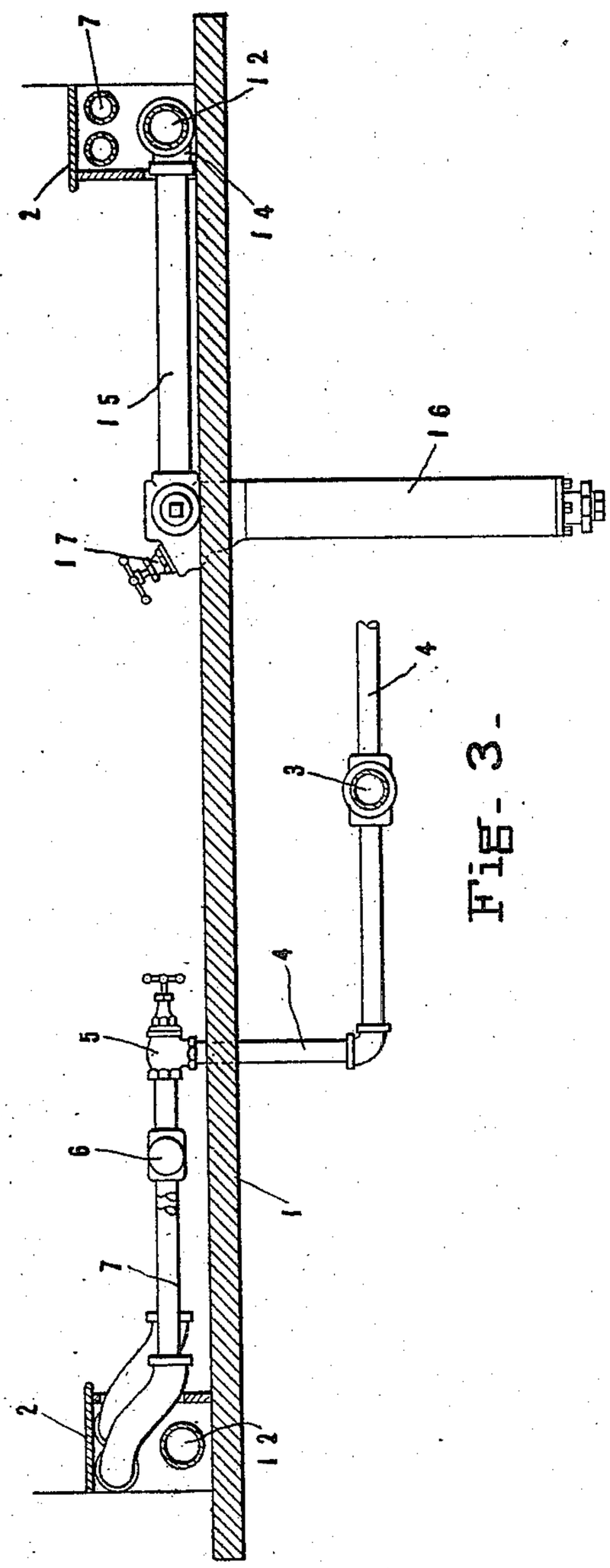

Fig- 3-

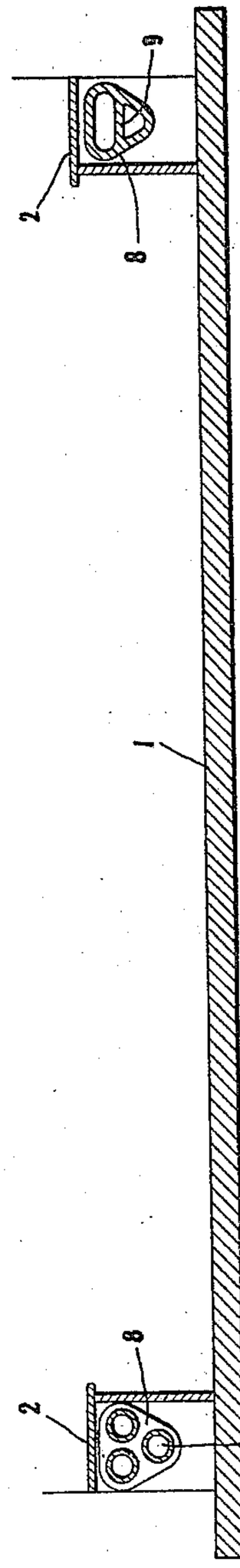

Fig- 4-

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UNITED STATES PATENT OFFICE.

ROBERT M. DIXON, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO THE SAFETY CAR HEATING & LIGHTING COMPANY, A CORPORATION OF NEW JERSEY.

HEATING SYSTEM.

965,283. Specification of Letters Patent. **Patented July 26, 1910.**

Application filed October 4, 1906. Serial No. 337,337.

To all whom it may concern:

Be it known that I, ROBERT M. DIXON, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Heating Systems, 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 heating systems, and is directed particularly to improvements in steam heating systems adapted for use in railway cars or like structures.

One of the objects of the invention is to provide a heating system of the above type characterized by increased efficiency.

Another object is to provide an efficient heating system of the above type which will occupy a minimum amount of space in a railway car.

Another object is to provide a heating system such that, while the same will operate effectively in a relatively small space in a railway car, the danger of rendering the system inoperative through freezing is substantially eliminated.

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

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction herein-described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is illustrated one of the various possible embodiments of my invention, Figure 1 is a top plan view of the floor of a railway car showing the same; Fig. 2 is a view in section taken on line *a*—*a* Fig. 1; Fig. 3 is a transverse sectional view taken through the floor of a railway car taken on line *b*—*b* Fig. 1; Fig. 4 is a similar view taken on line *c*—*c* Fig. 1.

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

Before describing my invention with particular reference to the drawings of this embodiment thereof, in order that the more important objects may be readily grasped it may here be noted that in heating systems for railway cars the piping thereof usually extends lengthwise of the cars at either side thereof. The seats of the cars usually extend over these pipes, which, in order to economize in room, are located as near the floor as possible. With such an arrangement of the piping, several difficulties have been encountered which preclude a successful operation of the heating systems under all conditions, owing to inability to secure the desired amount of fall in the conducting pipes. Among such difficulties are a sluggishness of flow of the heating medium, the inability to effect complete drainage of the water of condensation and the liability of the water which remains in the pipes to freeze and thus render the system inoperative. In eliminating, among others, the difficulties above alluded to, I have provided a system wherein ample fall is provided in the conducting conduits for the heat conducting medium, and at the same time I have reduced to a minimum the amount of space required in a railway car for accommodating the several conduits which constitute said system. Moreover, it should be apparent from the following description of this embodiment of my invention that a heating system constructed in accordance therewith will operate in an exceedingly effective manner.

Referring now to the drawings, 1 indicates the floor of a railway car which, as shown in Fig. 2 of the drawings, has the usual camber or, in other words, is inclined downwardly toward either end from the central portion thereof. A box, as shown at 2, is provided in the interior of the car at either side thereof, resting upon the floor, and this box is adapted to receive the piping which constitutes the heat radiating means of the heating system, said box being provided with suitable openings through which heat passes into the interior of the car.

The heating medium for the system, which is steam in the present instance, is conducted to the several cars by means of a common train pipe 3, said train pipe extending lengthwise of each car, as shown by the dotted lines in Fig. 1. Leading from train pipe 3, intermediate the ends of the car in the present instance are a pair of oppositely extending pipes 4, independently valved as shown at 5, each of said pipes leading into a distributing piece 6.

Inasmuch as the arrangements of the

piping upon opposite sides of the car are substantially identical, a description of one will suffice to impart a clear understanding of the invention. Leading from distributing piece 6 are a plurality of flow conduits 7, said conduits extending laterally and being suitably elbowed adjacent the wall of the car, whence they extend in opposite directions in the upper portion of box 2 toward the ends of the car in parallel relation with the floor thereof. Inasmuch as these flow conduits follow the camber of the floor, they are provided with a fall sufficient to provide for the flow of the water of condensation toward the ends of the car. Flow conduits 7 at their extreme ends are connected with separate apertures of a fitting 8 which, as shown in the drawings, is provided with a longitudinally extending web 9, said web extending to a position adjacent but not in contact with the outer end thereof and thus compelling the heating medium to flow substantially through the longitudinal extent of said fitting, whence it passes downwardly past the end of the web 9 as indicated by 10 in Fig. 2, and returns beneath said web to a discharge opening 11. Leading from discharge opening 11, in the present instance, is a return conduit 12 which is constituted by a plurality of serially-connected conduit sections, the diameters of which successively increase from the connection of the first of these different sized conduits with fitting 8, the central line of said sections being in a substantially horizontal plane, as indicated by the dotted line which passes therebeneath. The several sections of return conduit 12 are connected together by means of suitable couplings as at 13. Return conduits 12, which extend from the opposite ends of the car toward each other, are joined by means of a tee 14, from which extends a conduit 15 which carries off the water of condensation and discharges the same through a trap 16 extending downwardly through floor 1 of the car, which is adapted to automatically discharge the water of condensation from the system.

Having thus described my invention as disclosed in this embodiment thereof, the manner of operation, which should be largely apparent, is substantially as follows: The steam, after leaving the train pipe and passing through pipes 4 into distributing pieces 6, passes through flow conduits 7, fitting 8 and return conduits 12 to traps 16, and the water of condensation follows this same course owing to the inclination given the flow conduits by their parallel disposition with respect to the camber of the floor of the car and to the fall given the return conduits by means of the serially-connected conduit sections which successively increase in diameter from fitting 8 to their points of discharge at tees 14. Traps 16 are valved as shown at 17 in order to allow the water of condensation to be discharged therethrough in case of a failure of the automatic mechanism of the trap to properly drain the system.

It will accordingly be seen that I have provided a system which is capable of effectively operating in a minimum amount of space in a car and one in which a constantly inclined channel is provided for the water of condensation which passes from one end of the system to the other, thus providing against all chance of water being accumulated in the system which, becoming frozen, will render the same inoperative. The web which extends longitudinally of the fitting 8 not only insures that the heating medium shall pass entirely through the same, but also provides a strong and rigid construction which will operate to prevent a bursting of said fitting in case of failure of the automatic discharging mechanism to work properly or in the event of negligence on the part of a workman in failing to properly drain the system by means of the valves, allowing the system to become filled with water of condensation. The peculiar construction of the return conduits also provides a constantly increasing radiating surface for the heating medium, which becomes gradually cooler toward the end of the radiating system.

It will, of course, be understood that by the term "flow conduits" as used herein is meant the conduits which conduct steam from a suitable source of supply to the extremities of the system, and that by the term "return conduits" is meant the conduits through which the heating medium returns to its point of discharge.

As many changes could be made in the above construction and many apparently widely different embodiments of my invention could be made without departing from the scope thereof, I intend 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.

I desire it 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 a heating system of the class described, in combination, a radiator comprising a flow conduit adapted to conduct the heating medium and having a fall in the direction of flow therein, and a return conduit connected with said flow conduit and

having a fall in the direction of the flow of said heating medium, said return conduit comprising a plurality of serially-connected different sized sections and said fall being effected by the successive enlargement of the return conduit.

2. In a heating system of the class described, in combination, a radiator comprising a flow conduit adapted to conduct a heating medium from a suitable source of supply and having a gradual fall in the direction of flow of said heating medium, and a return conduit for said heating medium connected with said flow conduit and having a stepped fall in the direction of the flow of said heating medium, the central line of said return conduit extending substantially horizontally.

3. In a heating system of the class described, in combination, a radiator comprising a flow conduit adapted to conduct a heating medium from a suitable source of supply and having a gradual fall in the direction of the flow of said heating medium, and a return conduit for said heating medium connected with said flow conduit, said return conduit increasing in diameter in direction of flow and being constituted by a plurality of serially-connected different sized conduit sections having their central axes in alinement and extending in substantially a horizontal plane.

4. In a heating system of the class described, in combination, a radiator comprising a flow conduit adapted to conduct a heating medium, and a return conduit connected therewith, said return conduit being constituted by a plurality of serially-connected conduit sections the diameters of which successively increase in the direction of the flow of the heating medium therethrough, the axes of said conduit sections being disposed in horizontal alinement.

5. In a heating system of the class described, in combination, a radiator comprising a flow conduit which extends from a position intermediate the ends of a car toward one end thereof, said conduit following the camber of the car floor, and a return conduit connected with said flow conduit, said return conduit being constituted by a plurality of serially-connected successively larger sized sections the axes of which are disposed substantially in horizontal alinement.

6. In a heating system for railway cars or similar structures, in combination, a radiator comprising a flow conduit which extends in parallel relation with the camber of the floor of a car, and a return conduit connected therewith, the central line of which lies substantially in a horizontal plane, said return conduit increasing in diameter in successive steps in the direction of the flow of a heating medium therethrough.

7. In a heating system for railway cars or similar structures, in combination, a radiator comprising a plurality of flow conduits, and a single return conduit the diameter of which increases in successive steps in the direction of the flow of a heating medium therethrough, the central line of said return conduit extending substantially in a horizontal plane.

8. In a heating system for railway cars or similar structures, in combination, a radiator comprising a plurality of flow conduits which extend lengthwise of the car and follow the camber of the floor thereof, and a single return conduit connected with said flow conduits the central line of which is substantially level, said return conduit being constituted by a plurality of serially-connected different sized sections, the successive enlargements thereof providing a fall for the heating medium in the direction of the point of discharge of said return conduit.

9. In a heating system for railway cars or the like, in combination, a radiator comprising a plurality of flow conduits which lead from a position intermediate the ends of the car toward one end thereof, said conduits having a fall in the direction of flow of a heating medium therethrough, and a return conduit connected with said flow conduits the diameter of which increases in successive steps from its point of connection with said flow conduits to its point of delivery, the central line of said return conduit extending substantially horizontally.

10. In a heating system for railway cars or similar structures, in combination, a radiator comprising a plurality of flow conduits which lead from a position intermediate the ends of a car toward one end thereof, said conduits following the camber of the floor of the car, a single return conduit comprising a plurality of serially-connected conduit sections of different sizes the diameters of which successively increase in the direction of flow of a heating medium therethrough, the central axes of said conduit sections being in alinement and extending in a horizontal plane and a single means for connecting said flow conduits with said return conduit.

11. In a heating system for railway cars or similar structures, in combination, a radiator comprising a plurality of flow conduits adapted to receive a heating medium from a source of supply located intermediate the ends of a car and extending to one end thereof in parallel relation with the floor, a single return conduit which extends from a position near one end of the car toward the intermediate portion thereof and which increases in diameter in successive steps in the direction of flow of a heating medium therethrough, the central line of said return conduit extending substantially horizontally

and a member into which lead said flow conduits and from which extends said return conduit.

12. In a heating system for railway cars or the like, in combination, a radiator comprising a plurality of flow conduits extending in opposite directions from a position intermediate the ends of the car and receiving a heating medium from a suitable source of supply, a plurality of return conduits each of which is connected with one of said flow conduits, said return conduits increasing in diameter in successive steps in the direction of flow of the heating medium which is being conducted therethrough, and a plurality of fittings each of which is adapted to establish a communication between a plurality of said flow conduits and one of said return conduits.

13. In a heating system for railway cars or similar structures, the combination, with the train pipe, of a radiator comprising a plurality of distributing pieces arranged intermediate the ends of a car and connected with said train pipe, a plurality of flow conduits leading from said distributing pieces and extending in opposite directions toward either end of the car, and a plurality of return conduits each of which is connected with a plurality of said flow conduits, said return conduits being constituted by a plurality of serially-connected conduit sections which successively increase in diameter from the point of connection with said flow conduits.

14. In a heating system of the class described, in combination, means for supplying a heating medium, a radiator comprising a plurality of flow conduits of uniform diameter extending from said supplying means, and a single return conduit connected with said flow conduits the diameter of said return conduit increasing in successive steps in the direction of flow of said heating medium therethrough.

15. In a heating system of the class described, in combination, means for supplying a heating medium, a plurality of flow conduits of uniform diameter extending from said supplying means, a single return conduit connected with said flow conduits, said return conduit being constituted by a plurality of serially-connected tubular sections the diameters of which successively increase from its point of connection with said flow conduits, and a trap connected with said return conduit adapted to discharge the water of condensation therefrom, said flow conduits and said return conduit being comprised in a radiator.

16. In a heating system of the class described, in combination, a supply pipe, a discharge pipe, and a radiator comprising two conduits for conducting the heating medium from one to the other of said pipes, one of said conduits having a gradual fall and the other having a stepped fall in the direction of flow of the heating medium therethrough.

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

ROBERT M. DIXON.

Witnesses:
F. E. KESSINGER,
ELMER E. ALLBEE.