(No Model.)

3 Sheets—Sheet 1.

J. EMERSON.

HEATING SYSTEM FOR RAILWAY CARS.

No. 383,637. Patented May 29, 1888.

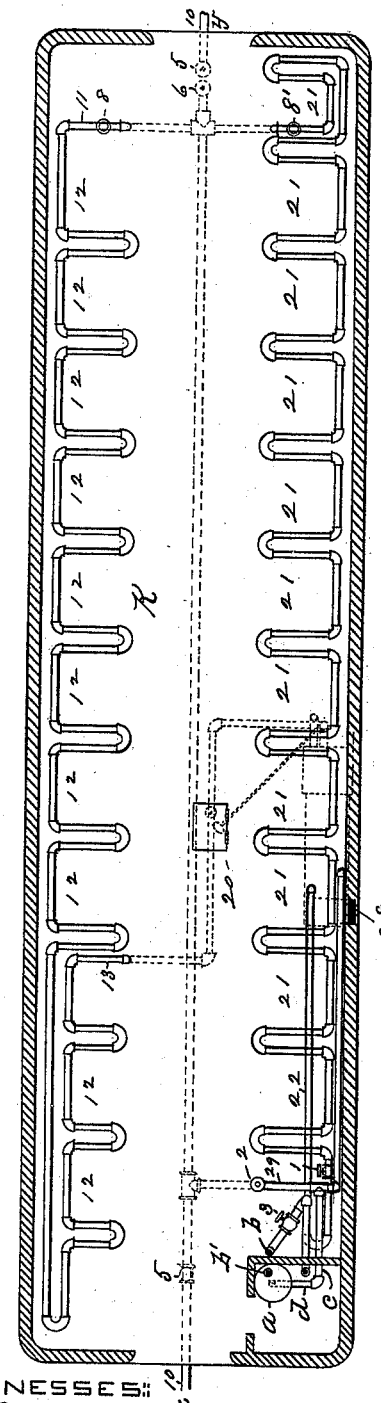

Fig. 1.

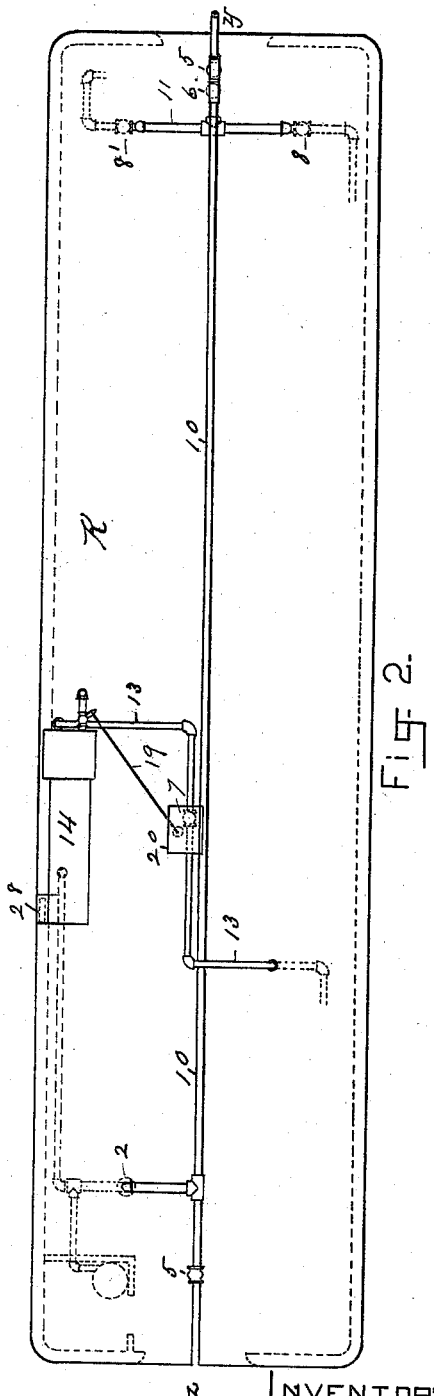

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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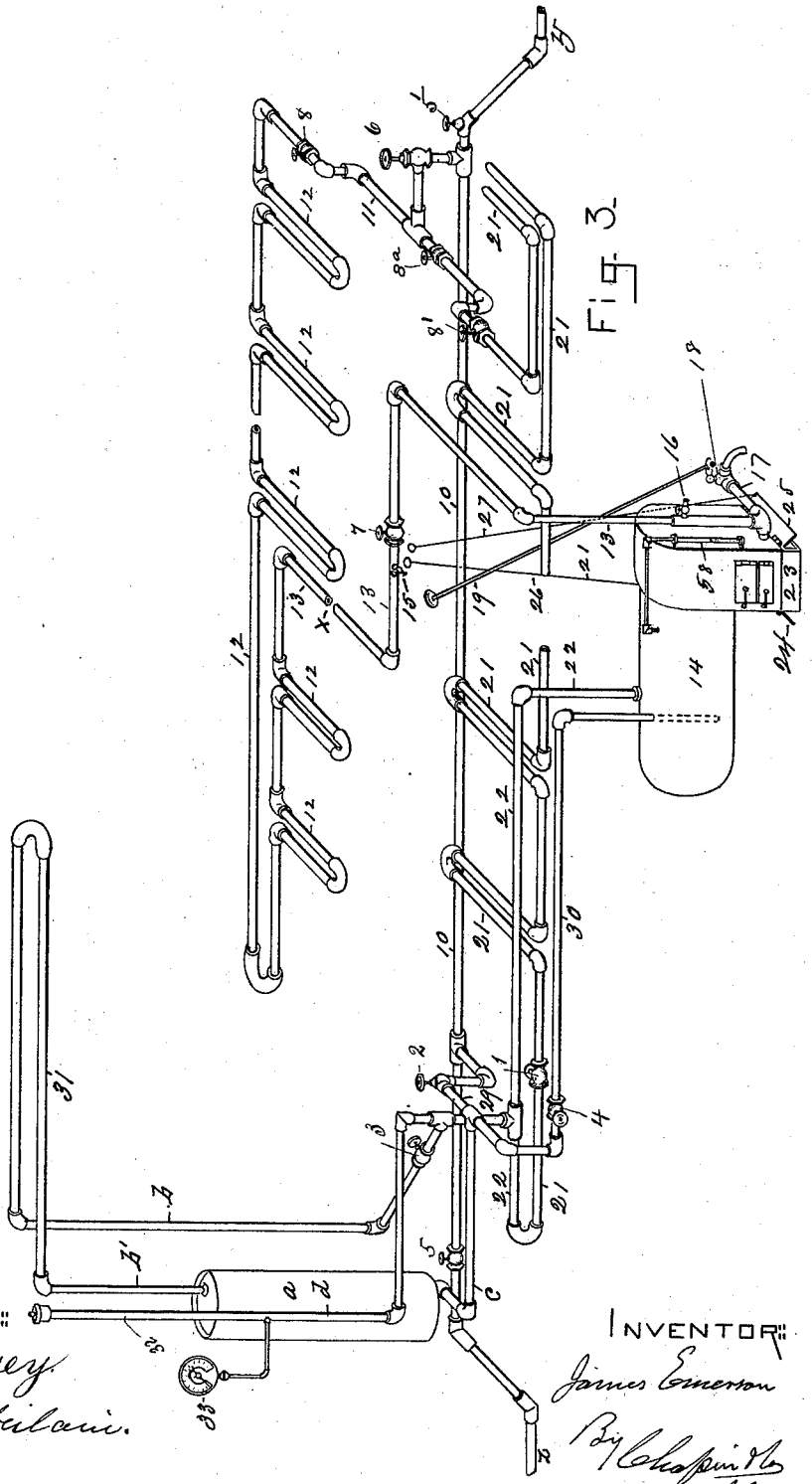

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

J. EMERSON.

HEATING SYSTEM FOR RAILWAY CARS.

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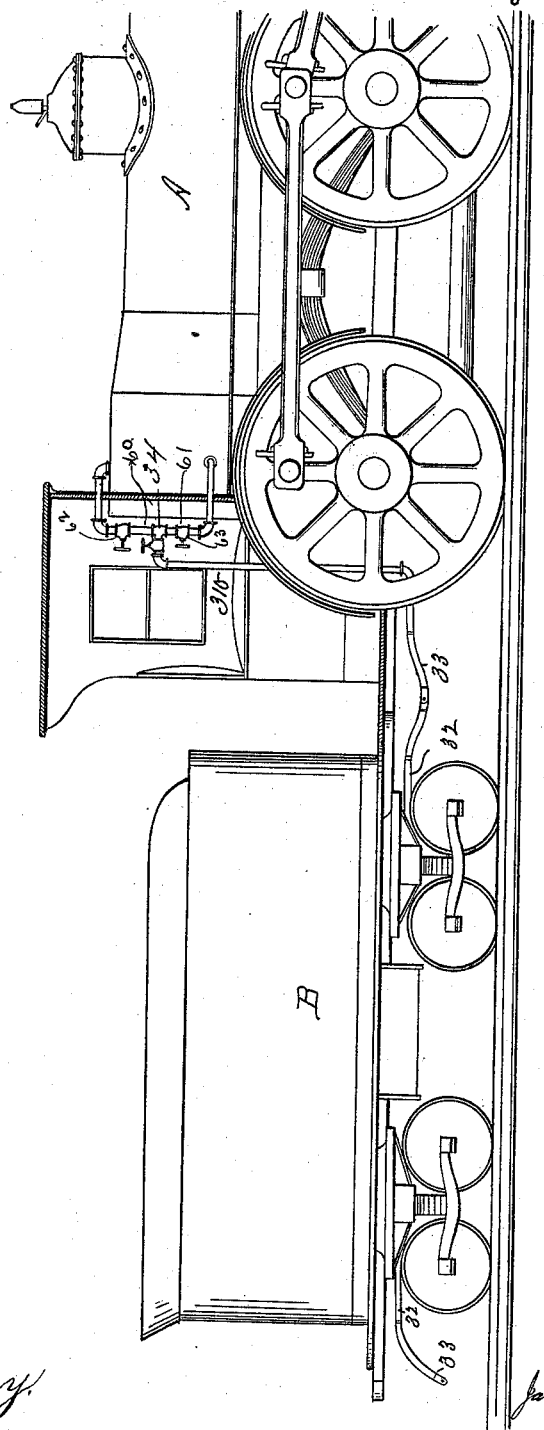

Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES EMERSON, OF WILLIMANSETT, MASSACHUSETTS.

HEATING SYSTEM FOR RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 383,637, dated May 29, 1888.

Application filed July 12, 1886. Serial No. 207,827. (No model.)

To all whom it may concern:

Be it known that I, JAMES EMERSON, a citizen of the United States, residing at Willimansett, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Heating and Lighting Systems for Railway-Cars, of which the following is a specification.

This invention relates to improvements in heating systems for railway-cars, and is in the nature of an improvement on my patent of March 17, 1885, to which reference may be had, the object being to provide improved means for warming cars, whereby all danger of setting the cars on fire by the warming devices thereof in case of accident to a train is obviated; and the invention consists in the peculiar arrangement of the devices for generating and distributing the heat throughout a car or cars of a railway-train, all as hereinafter fully described, and set forth in the claims.

In the drawings forming part of this specification, Figure 1 is a horizontal sectional view, and Fig. 2 is a bottom plan view, of a car provided with steam-pipe circulations and steam-generating devices embodying my improvements. Fig. 3 is a perspective skeleton view of the steam pipe and boiler system embodied in the heating devices shown in said Figs. 1 and 2, shown detached from a car. Fig. 4 is a side elevation of a part of a locomotive-engine and its tender, the former being provided with steam and hot-water pipes, adapting it to be connected with the said heating-pipes and steam-generating apparatus of the cars.

In the drawings, A is the engine, provided with the usual tender, and having a supply-pipe, 310, leading therefrom to a suitable conducting-pipe, 32, under the tender B, said pipe 32 having the usual flexible connections, 33, for uniting it with the main steam-pipe 10 of the cars. The said supply-pipe 310 has a twin connection, 34, with the boiler of the engine, as shown in Fig. 4, one end, 60, of said connection being attached to the steam-chamber of the boiler of the engine, and one end, 61, below the water-line thereof; and said twin connection is provided with two valves, 62 and 63, as shown, to admit steam or hot water from said boiler into the pipe 310, so that either one may be supplied to the cars of the train, for the purposes hereinafter set forth, the said end 61 of the twin connection 34 constituting a hot-water branch from the steam-supply pipe 310 to the water-space of the locomotive.

The purpose of the aforesaid twin connection of the pipe 310 with the boiler of the locomotive F is to provide for supplying steam from said boiler to the heating-pipes 12 and 21 of the cars, and for supplying hot water from the same source to the auxiliary boiler 14, below described, under the car when from any cause the last-named boiler lacks the requisite supply of water, or when it may be desirable to displace cold water within said boiler with that which is hot, in order to quickly generate steam for warming the car, as below set forth.

When the circulating steam-pipes in the car are receiving steam from the locomotive, the upper valve, 62, of the twin connection 34 is open and the lower valve, 63, is shut, and when it becomes desirable to supply hot water from the locomotive to the boiler 14 under the car said valve 62 is shut and the valve 63 is opened.

When the boiler 14, Fig. 3, is to be supplied with hot water from the locomotive, and supposing that the water is to enter the main pipe 10 at *z*, Fig. 3, the valves 5′ and 6 are closed and valves 5, 2, and 4 are opened, and when sufficient water is drawn into the boiler valve 4 is shut.

The auxiliary boiler 14 (shown in perspective in Fig. 3, in plan in Fig. 2, and in dotted lines in Fig. 1) is constructed, preferably, of the locomotive-boiler type, as indicated by the form shown in the drawings, which type consists of a boiler having a fire-box within the same surrounded by water in the leg of the boiler, coal being supplied through the usual door shown in Fig. 1. An ash-pan, 23, is secured to the lower end of the leg of the boiler under the grate, and has dampers 24 and 25 hinged at two sides of said ash-pan, with which dampers are connected the rods 26 and 27, whose upper ends terminate in the recess 20 in the floor of the car. Said rods provide means for operating said dampers from the interior of the car to regulate the draft of the boiler. Said boiler 14 is suspended under the car-body, and is connected with a flue, 28, (see Figs. 1 and 2,) which is of metal or metal-lined, and passes up between the side walls of

the car to the roof; or said flue may pass up through the body of the car at any convenient place.

The piping on one side of the car, which is depended upon for warming the latter, consists of the coils and straight lengths 12 on one side of the car, arranged generally under the seats thereof and connected by the inlet end thereof with the main steam-pipe 10, as shown, which receives steam from the locomotive A or from the auxiliary boiler 14 under the car, as below described. A drip-pipe, 13, carries the water of condensation from said pipes 12 to the boiler under the car. The heating-pipes of the opposite side of the car consist of those indicated by 21, which are also connected with said main steam-pipe 10, and a drip-pipe, 22, serves to convey the water of condensation therefrom to the boiler under the car. The coil 31 is a condenser, as hereinafter described, and *a* is a reservoir receiving water from said condenser. The boiler 14 and its connection with the said car-heating pipes and the main pipe 10 are fully described. Requisite valves are provided in said heating-pipes and their connections, as below described, to control the flow of steam and water.

The operation of my improvements is as follows: Steam from the locomotive entering main pipe 10 at *z*, valve 5 being open and valve 2 shut, is conducted by said main pipe to the opposite end of the car, and escapes to the adjoining car if valve 5′ at the opposite end, *y*, of the main be open, filling the mains of one or more cars with live steam under pressure. Valve 6 being then opened, steam flows from the main 10 to the cross-pipe 11 under the floor of the car, and from pipe 11 into the warming-pipes 12 (both coils and straight lengths) if valve 8 be open, and the water of condensation from said pipes 12 flows through the drip-pipe 13 (the latter passing down through the floor of the car at its broken point *x*, and continuing thereunder, as shown in Fig. 3) to the lower part of the boiler 14, into which it conducts said water, the valve 7 in pipe 12 being open. A waste-cock, 15, is placed in the drip-pipe 13 near the valve 7, through which the water running from the pipes 12 may be allowed to escape when it is not required in the boiler. A waste-cock, 16, similar to the above-named one, is placed in the lower part of pipe 13, to provide for drawing all the water (down to said cock) out of said pipe when required to prevent freezing, and to hasten the steam-circulation in pipes 12, if need be, whether the steam be drawn from the boiler or from the main 10. A branch pipe, 17, leads off from the pipe-connection where said pipe 13 is connected to the boiler, and near its end is placed a blow-off cock, 18, to which is connected a rod, 19, which extends partly through the bottom of the car into a recess, 20, in the latter under a trap-door in the floor of the car, as shown in Figs. 1 and 2, whereby said blow-off cock is opened and shut by a person in the car to regulate the quantity of water in the boiler. When it is desired to let steam into the heating-pipes 21 on the opposite side of the car from said pipes 12, the valve 8′ in an extension of pipe 11 is opened, and, valve 1 being opened also, the steam freely circulates, and the water of condensation is forced from said pipes 21 through the pipe 22 into the boiler 14. By arranging the valves 8, 8′, 7, and 1, as above described, the pipes on both sides of the car are utilized for warming; but by shutting either one of the valves 8 or 8′ and its corresponding drip-pipe valve and leaving the other one open the steam circulates only in the heating-pipes on one side of the car, thereby providing an amount of active heating-surface proportioned to cold or moderate weather.

The above-described operation of the steam contemplates using steam which is conveyed from the engine by the main pipe 10, the boiler 14 being the receptacle of the resultant water of condensation, whereby sufficient of the latter in a warm state is constantly kept in said boiler to provide, in case of need, for quickly generating steam therein to keep the car warm, as when, for instance, a car which must be kept warmed is left at a station, and therefore deprived of its supply of steam from the engine. Said boiler is provided with the usual glass water-gage, 58.

When the car is deprived of the engine as a source of steam-supply, the circulation of steam from the boiler through the heating-pipes of the car is operated as follows: The valves 5 5′ at the opposite ends of the main 10 are shut to confine the distribution of steam from the boiler 14 to the pipes of the car to which said boiler is attached, although under some circumstances said steam may be conveyed to an adjoining car. Fire is then started in the boiler, the water in the latter is reduced to a proper height, and valve 1 in the pipe 21 is opened, letting steam flow through the pipe 22 into the heating-pipes 21, and thence through pipe 11 (valve 8′ being open) into the main 10, the water of condensation being forced from the latter through the cross-pipe 29 into the pipe 30, and by the latter conducted to the boiler, its lower end dipping into the latter to seal it, as shown in dotted lines in Fig. 3, valves 2 and 4 being, under said circumstances, open. When desired, valve 8, as well as valve 8′, is opened, thereby causing all of the heating-pipes of the car to be supplied with steam from the auxiliary boiler.

It is desirable, in operating such a steam warming system for cars as herein described and shown, that little or no waste of water should be permitted from the auxiliary boiler 14 and the pipe-circulations connected therewith, and to that end provision is made, in case the car becomes too warm, for diverting the steam-circulation (still maintaining a steam-generating fire in the boiler) from the heating-pipes in the car to a condenser-circulation, 31, of suitable superficial area, connected with the steam-pipe 22 from said boiler

and located on the roof of the car, a drip-pipe, *b'*, from said condenser leading to a reservoir, *a*, from which any water it may contain is drawn into the boiler through the pipes *c*, 29, and 30 by opening the valve 4 and closing valve 2. To divert the steam from the car-heating pipes to said condenser, valve 1 is shut and valve 3 is opened. A steam-gage pipe, 32, having a gage, 33, connected thereto, is connected with the pipe 22, and extends up into the car to indicate the steam-pressure in the boiler.

Owing to the fact that a steam main of limited capacity only can be conveniently applied to cars for conveying steam from the locomotive thereto for heating purposes, and that in very long trains, in cold weather, it is difficult with a small main pipe to carry steam under suitable pressure to some of the cars of a long train, it is found desirable to provide in the heating system herein described and shown means for cutting off the heating-pipes 12 and 21 of the car from the main 10 by closing valves 6 and 2, thereby letting steam from the locomotive flow directly through the car to other cars and warming said car (though it be in the middle of a train or elsewhere between other cars) by steam from the auxiliary boiler 14, the valves 1, 8', and 8 being opened to admit steam from said boiler to the said heating-pipes.

In practice the valve 8^a in pipe 11, between valves 8 and 8', is left open unless it is required to be shut for the purpose of repairing some of the steam-connections.

What I claim as my invention is—

1. The within-described improved means for warming railway-cars by steam, which consist of a main steam-pipe, 10, running through the car, a series of car-heating pipes, 12 and 21, connected with said pipe 10, combined with a steam-boiler, 14, suspended under the car, a steam-pipe, 22, connecting said boiler with said heating-pipes, one or more drip-pipes connecting said heating-pipes and boiler, connecting-pipes and stop-valves, substantially as described, for controlling the flow of steam from said boiler through said heating-pipes, and a condenser-circulation consisting of the pipes 31, connected with said heating-pipes and located outside the car and higher than said heating-pipes, and having no outlet except at its connected ends, substantially as set forth.

2. The within-described improved means for warming railway-cars by steam, which consist of a main steam-pipe, 10, running through the car, a series of car-heating pipes, 12 and 21, connected with said pipe 10, combined with a steam-boiler, 14, suspended under the car, a steam pipe, 22, connecting said boiler with said heating-pipes, one or more drip-pipes conecting said heating-pipes and boiler, connecting-pipes and stop-valves, substantially as described, for controlling the flow of steam from said boiler through said heating-pipes, and a condenser-circulation consisting of the pipe 31, connected with said heating-pipes and located outside the car and higher than said heating-pipes, and having no outlet except at its connecting ends, and a water-reservoir, *a*, connected with said pipe 31, substantially as set forth.

3. The combination, with a locomotive and a car, of an auxiliary boiler located on the car, a circuit of heating-pipes in communication with said boiler, and a pipe leading from the locomotive, and communicating at one end with the pipes of the circuit and at the other end with the steam and water spaces of the locomotive-boiler, substantially as described.

JAMES EMERSON.

Witnesses:
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FRED W. HERSEY.