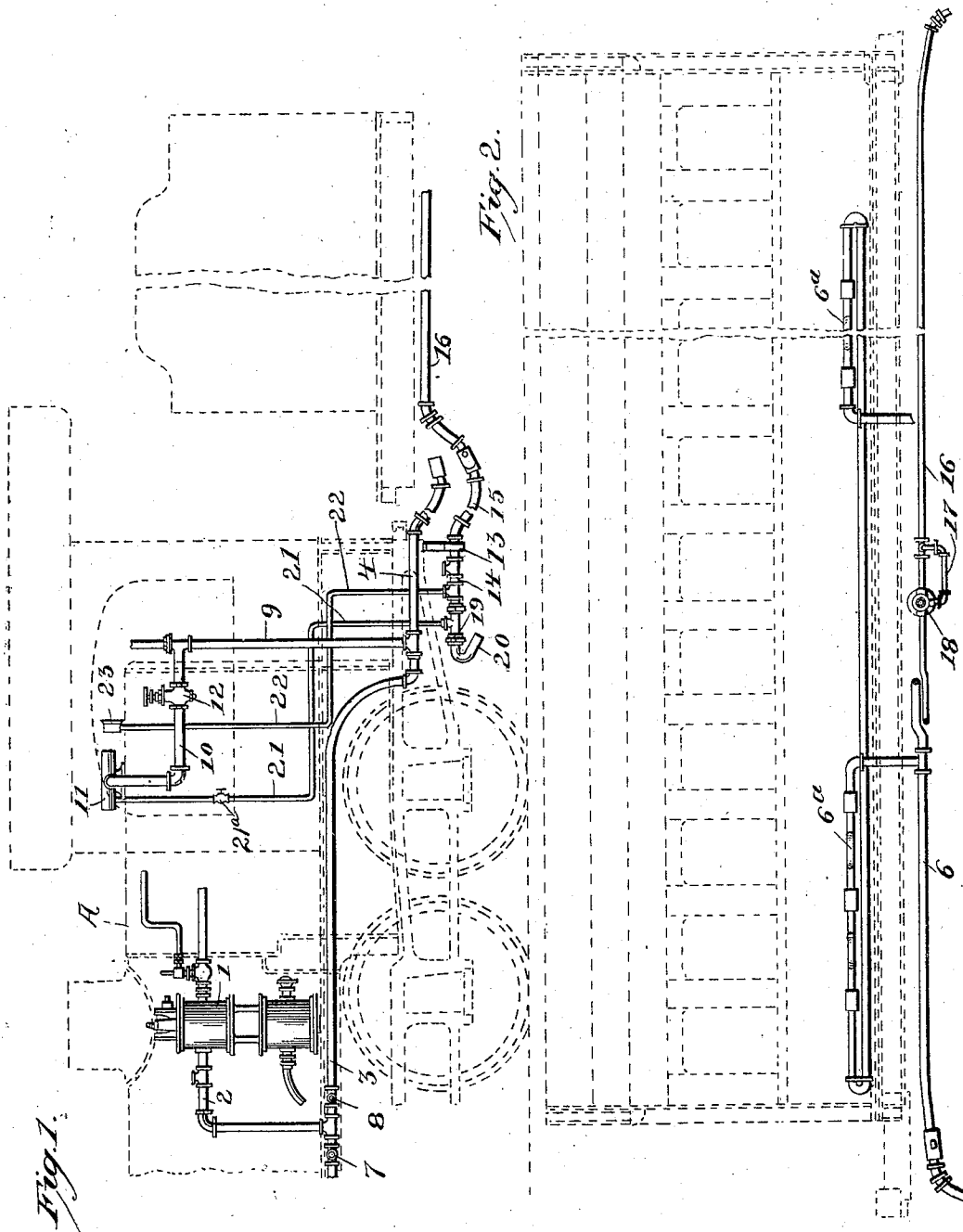


No. 833,510.

PATENTED OCT. 16, 1906.

F. DAVIS.
CAR HEATING SYSTEM.
APPLICATION FILED JULY 20, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

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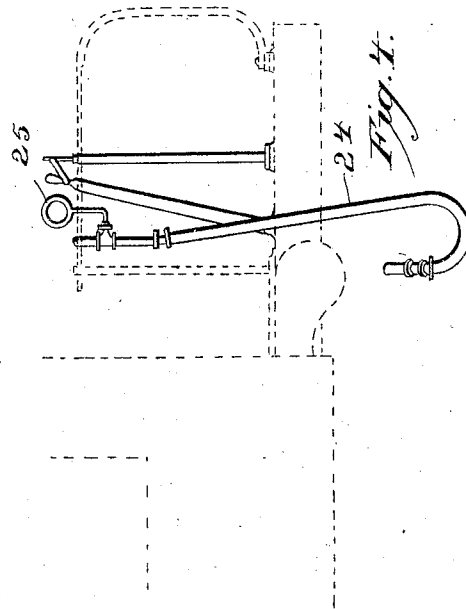
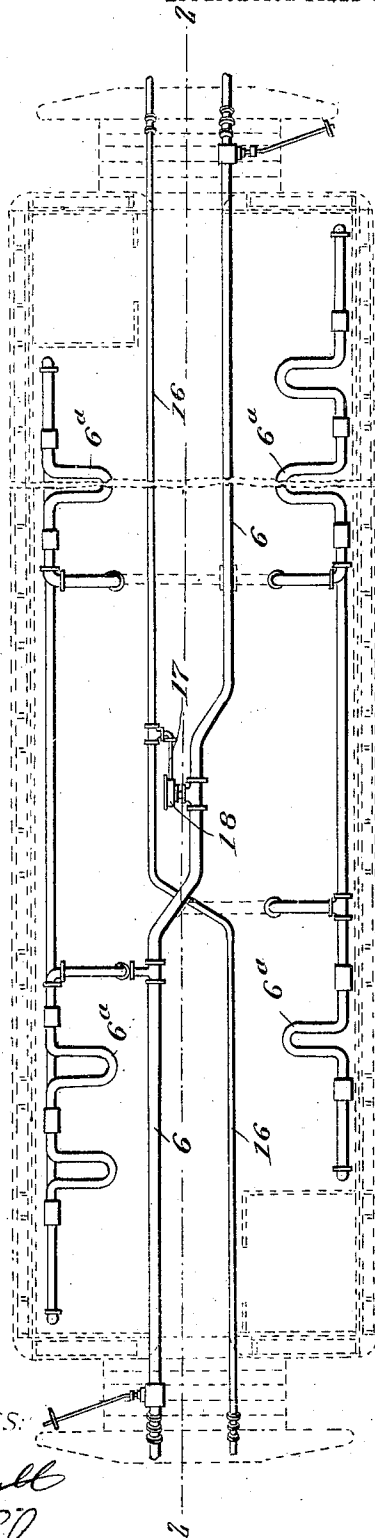
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2 SHEETS—SHEET 2.

Fig. 3.



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FRANK DAVIS, OF ATLANTA, GEORGIA.

CAR-HEATING SYSTEM.

No. 833,510.

Specification of Letters Patent.

Patented Oct. 16, 1906.

Application filed July 20, 1905. Serial No. 270,576.

To all whom it may concern:

Be it known that I, FRANK DAVIS, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented new and useful Improvements in Car-Heating Systems, of which the following is a specification.

My invention has relation to new and useful improvements in car-heating systems which embody a circulating system of pipes carried by the cars of a train, through which system circulates a heating medium in the form of exhaust-steam from the locomotive-cylinders, the brake-pump, or other source, means being provided for regulating and maintaining the circulation of the steam through said pipes.

The primary object of the invention is to provide an improved and simplified heating system of the character set forth and to embody in connection therewith means for maintaining at all times the circulation of the heating medium.

A further object of the invention is to provide a construction that may be installed in a car already equipped with a one-pipe or with a return-pipe system without removing the main supply-pipe or the heating-coils of such a system or systems.

The invention consists in the novel construction and arrangement of parts to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

I have fully and clearly illustrated my invention in the accompanying drawings, to be taken as a part of this specification, and wherein—

Figure 1 is a side elevation of the apparatus embodying my invention and showing its relation to the locomotive. Fig. 2 is a section taken on the line 3 3 of Fig. 3. Fig. 3 is a plan view of the circulating system with which each car is equipped; and Fig. 4 is an elevation of the terminal of the return-pipe, showing its relation to the rear platform.

In the embodiment herein shown and described the invention is shown as applied to a "one-pipe system"—i. e., a system in which the steam passes from the supply-pipe to the radiators, traverses the radiators, and returns to the supply-pipe as steam or condensation-water; but I do not wish to be understood as limiting myself to this specific application of the invention, as it will be ob-

vious that the same may be applied to other systems than that shown.

Referring to the drawings, A designates in dotted lines a locomotive of a train which carries the improved heating apparatus embodying my invention, and 1 designates the pump for compressing air for use in connection with the air-brakes. Extending from the steam-cylinder of the pump is an exhaust-pipe 2, which connects at its lower end with a horizontally-disposed pipe 3, running longitudinally of the locomotive-boiler. The forward end of said horizontal pipe terminates at the forward portion of the locomotive in the usual manner, where it is open to permit the exhaust of the steam-cylinder of the pump, except under conditions to be presently set forth. The rear end of the pipe 3 is carried below the fireman's deck of the locomotive, as shown at 4, where it is provided with a hose-coupling of any approved form, by means of which said pipe 3 is connected to a pipe 6, carried by the cars and constituting the main supply-pipe of the heating system 6^a, to which said pipe 6 is connected. This pipe 6 may be the supply-pipe of an ordinary one-pipe heating system in cases where cars already equipped with such a system are to be converted into a return-pipe system according to this invention, or it may be the supply-pipe of a car equipped with any ordinary return-pipe system, it being understood that in so far as the said main supply-pipe is concerned this may be the same as now generally employed in either the one-pipe or return systems. Obviously this statement applies to cars already equipped with some known system that may be converted into a system operating according to the present invention, and the statement is made simply to show how the old systems may be converted into the new according to this invention.

Arranged in the pipe 3 at a point between the pipe 2 and its exhaust end is a hand-operated valve 7, which is operated to open the passage through the forward part of the pipe 3 to permit the steam to exhaust from the steam-cylinder of the pump to the atmosphere in the usual manner when it is not desired to employ said steam for heating purposes, said valve being moved to closed position when it is desired to direct the steam through the circulatory system on the cars by way of the pipe 3. Located in the pipe 3

at a point in rear of the pipe 2 is a second hand-operated controlling-valve 8, which is operated to open the passage through the rear portion of the pipe 3 when the valve 7 is closed and it is desired to have the steam flow through the heating system, said valve 8 being closed when the valve 7 is opened to permit the steam to exhaust to the atmosphere.

10 Rising vertically from the pipe 3 and extending upward within the locomotive-cab is a feed-pipe 9, said pipe being connected by a pipe 10 with a steam-chest 11, mounted on the upper side of the engine-boiler, said chest having communication with the boiler, so that live steam may enter said chest and thence flow through said pipe into the pipe 4, a controlling-valve 12 being located in the pipe 10 to regulate the flow of said live steam. 15 Under certain circumstances it sometimes occurs that the exhaust-steam is not sufficient to properly heat the cars, and at such times live steam from the locomotive-boiler may be fed to the circulation system through the pipes 10, 9, and 4 to raise the temperature to the desired degree.

Supported by a suitable hanger or bracket 13, depending from the bottom of the fireman's deck, is a horizontally-disposed short pipe-section 14, provided at its rear end with a hose-coupling 15, by means of which said pipe may be coupled to a pipe 16, mounted on the cars, which pipe 16 forms the return-conduit of the circulatory heating system, being connected by a cross-pipe 17 on each car with the main pipe 6 thereon. In this pipe 17 is located a thermostatic valve or trap 18, which opens, when the temperature drops below a certain degree, to permit the water of condensation formed by the cooling of the pipes to be drawn into said pipe 16 and discharged therefrom in a manner and by means to be presently set forth.

Means are provided for maintaining at all times a vacuum in the return-pipe of the system, so that all water of condensation will be drawn from the system as soon as formed in sufficient quantity to operate the valves 18. This means will now be described. Located at the forward end of the short pipe-section 14 is a steam-ejector 19, which is employed to create a vacuum in the return-pipe 16 and to discharge air and water of condensation therefrom, said ejector being formed with a rearwardly-directed outlet-nozzle 20, which when discharging the return-pipe throws the water of condensation backward away from the locomotive, so as not to come into contact with any of the parts of the latter. The steam-ejector is operated by means of steam taken from the steam-chest 11, or it may be taken directly from the boiler, the steam being fed to the ejector through a pipe 21 of smaller relative diameter than the pipe 3, connected at one end to

the said steam-chest and at the other end to the ejector. The passage through the pipe 21 is open while the heating of the cars is desirable, so that live steam at boiler-pressure may be fed to the ejector to cause the latter to create a continuous suction on the pipe 16 to discharge the water of condensation therefrom and maintain a vacuum in said pipe, so that the water of condensation is also withdrawn from the main heating-pipes on the cars whenever the temperature falls sufficiently to cause the thermostatic valves 18 to open. By this arrangement, it will be seen that a continuous vacuum may be maintained in the return-pipe, so that the circulation through the system is caused whenever the temperature in the heating-pipe drops so as to permit the water of condensation and air to be drawn therefrom to permit the flow of the exhaust-steam from the brake-pump or said exhaust-steam, together with the live steam, into the system. It will also be seen that as long as a proper temperature is maintained the thermostatic valve or trap will remain closed, so as to prevent the flow of the steam from the pipe 6 to the return-pipe 16. The pipe 21 may be provided with a valve 21^a to be operated to cut off the supply of steam to the ejector when the heater is not in use.

Connected at one end to the pipe-section 14, at a point in rear of the ejector, is a pipe 22, said pipe extending vertically to a point within the locomotive-cab and carrying a vacuum-gage 23 to indicate the vacuum within the return-pipe.

The pipe 16 terminates at the rear car of the train in a flexible pipe 24, which may be connected at its free end to the platform-rail of the car, as shown, and this flexible pipe has connected thereto a vacuum-gage 25, by which the trainmen may be apprised of the vacuum in said pipe 16.

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

1. In a train-heating system, the combination with the main steam-supply pipe of the system leading from a suitable source of supply on the locomotive to the car or cars of a train, of a return-pipe leading from the locomotive to each car or cars of the train, a cross-pipe directly connecting the main and return pipes on each car, a thermostatic valve in each cross-pipe, and an ejector at the open end of the return-pipe on the locomotive, said ejector being under the control of the engineer.

2. In a train-heating system, the combination with the main steam-supply pipe of the system leading from a suitable source of supply on the locomotive to the car or cars of the train, of a return-pipe leading from each car or cars of the train and terminating on the locomotive in an open-ended return-bend, a

steam-pipe discharging into said return-bend and forming with the latter an ejector to draw off water of condensation from the system through the return-pipe, a cross-pipe directly connecting the main and return pipes on each car, and a thermostatic valve in each cross-pipe, substantially as described.

3. In a car-heating system, the combination with a locomotive and the cars of the train, of a main supply-pipe carried by the cars, means carried by the locomotive and connected to said main supply-pipe to feed exhaust-steam to the latter, a steam-chest on the locomotive having communication with the boiler thereof, a return-pipe carried by the cars, a cross-pipe connecting the main and return pipes, a thermostatic valve in said cross-pipe to establish communication between the main and the return pipes when the temperature drops below a determined point, a steam-ejector carried by the locomotive and connected to the discharge end of the return-pipe, and a pipe connecting said steam-chest and the ejector to continuously feed steam to said ejector to operate the latter to maintain at all times a vacuum in said return-pipe.

4. In a car-heating system, the combina-

tion with a locomotive and the cars of the train, of a main supply-pipe carried by the cars, means carried by the locomotive and connected to said main supply-pipe for feeding exhaust-steam to the latter, a return-pipe on the cars, a cross-pipe connecting the main and return pipes, a thermostatic valve in said cross-pipe to establish communication between the main and return pipes when the temperature drops below a determined point, an ejector on the locomotive at the free end of the return-pipe, a steam-chest on the locomotive in communication with the boiler thereof, a pipe connecting said steam-chest and the heating system whereby live steam may be fed to the return-pipe, and a pipe connecting said steam-chest and said ejector to continuously feed live steam to the latter, whereby said ejector is operated to maintain a vacuum at all times in the return-pipe.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK DAVIS.

Witnesses:

J. W. STONE,

H. G. HODGSON.