(No Model.)

N. W. WILLIAMES.

HEATING APPARATUS FOR RAILWAYS.

No. 492,129. Patented Feb. 21, 1893.

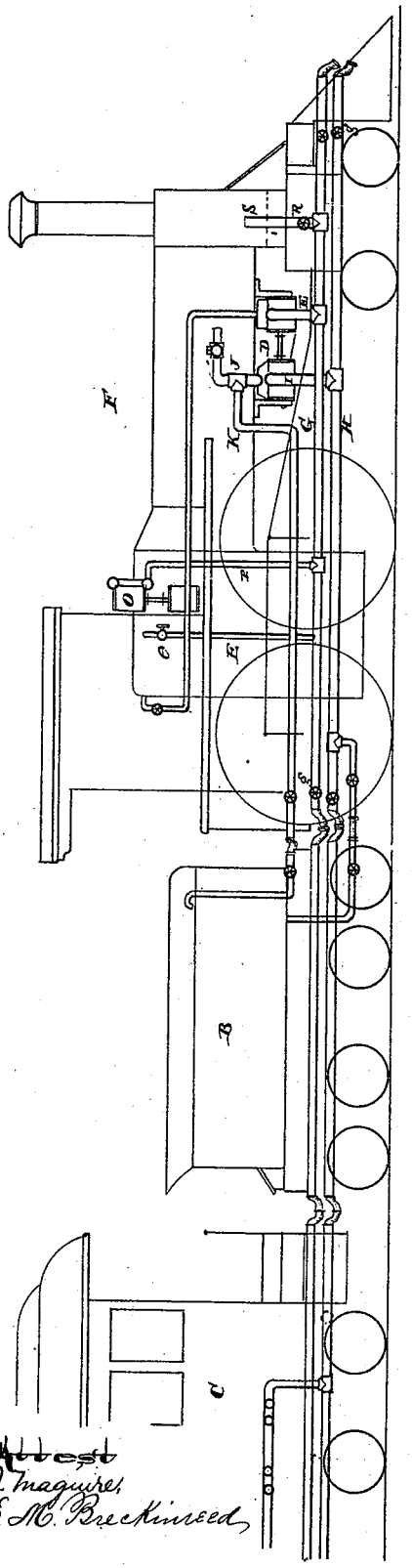

Fig. 1

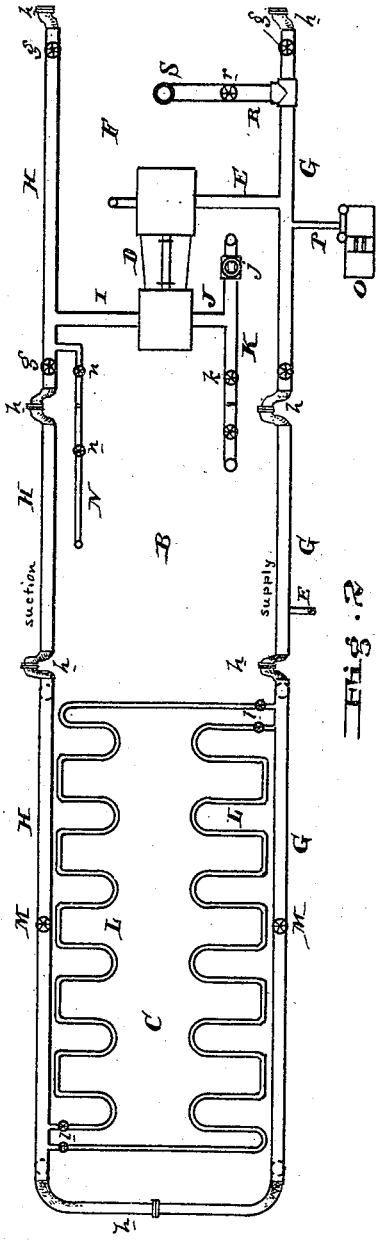

Fig. 2

Witnesses
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[illegible]

UNITED STATES PATENT OFFICE.

NAPOLEON W. WILLIAMES, OF PHILADELPHIA, PENNSYLVANIA.

HEATING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 492,129, dated February 21, 1893.

Application filed August 28, 1885. Serial No. 175,531. (No model.)

To all whom it may concern:

Be it known that I, NAPOLEON W. WILLIAMES, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Heating Apparatus for Railways, of which the following is a specification.

My invention has reference to heating apparatus for trains and other vehicles; and it consists essentially in the combination of a circulating pump or vacuum device either located upon the locomotive car or vehicle and combined with a main supply pipe and a suction or return pipe, and suitable heating pipes or radiators in the cars or vehicles to be heated whereby preferably low pressure steam is caused to circulate through the radiators by the production of the partial vacuum or suction created in the return pipe, the various cars to be heated being coupled together in such a manner that the steam supply and suction pipes are made continuous; and in many details of construction all of which are fully set forth in the following specification and shown in the accompanying drawings which form part thereof.

In Letters Patent granted to me April 4, 1882, heating apparatus adapted to buildings and embodying substantially the same principle is there described, and this application is intended to embody the same general principle only applied to moving vehicles such as railway trains, therefore in this application I do not claim the heating apparatus generically but only as applied to moving vehicles such as railway trains in which more than one car or truck are coupled together.

While I describe the use of a steam pump as a vacuum creating device and employ the exhaust steam from the steam cylinder thereof as the steam which is caused to circulate in the heaters it is self evident that the steam might be drawn from the boiler in the form of live steam or might be drawn from the exhaust of the locomotive or even the exhaust of the Westinghouse compressor, though convenience would dictate that an auxiliary steam pump or a vacuum creating device should be used both for the production of the vacuum and supply of the heating steam.

A vacuum pump produces a tendency to create a vacuum, as it removes all air as well as steam and water from the system and maintains the constant circulation necessarily required. An injector in the end of the suction pipe could not be kept in working condition for as soon as the condensed steam became hot the injector would stop working, and also a bubble of air would instantly stop the working of the injector, and much air necessarily finds its way into the mains hence an injector would not work satisfactorily or continuously, and a pump would consequently be required to maintain a constant and uniform partial vacuum.

In the drawings:—Figure 1 is a side elevation of a portion of a railway train having my improvements applied thereto and, Fig. 2 is a plan view of the arrangement of the pipes and apparatus generally, showing the arrangement of the same upon the locomotive, tender and car.

F is the locomotive, B is the tender, and C is the car. All are supplied with steam supply pipe G and suction pipe H which may be coupled up as in the case of Westinghouse air brakes by flexible couplings *h*.

The car is provided with heating pipes L located under the seats in the usual way one end of which is connected to the steam supply pipe G and the other end of which is connected to the suction pipe H. The admission or passage of steam through said heating pipes or radiators may be controlled by valves I.

The pipes G and H may be provided with stop valves M by which the circulation of steam through the radiating pipes may be controlled and the passage of steam through the closed couplings in the rear of the train may be increased or diminished. If desired each end of the pipes G and H on each car may be provided with valves as indicated in dotted lines so that these pipes on the rear car need not be coupled by the couplings as shown.

The locomotive is provided with a suction-creating apparatus D which consists essentially of a steam pump, and the exhaust of the steam cylinder thereof is connected by a pipe E with the steam supply pipe G. Steam to this pipe G may be furnished from the boiler of the locomotive by pipe E having valve *e*. The vacuum creating cylinder or pump has its suction port connected by a pipe

I with the suction pipe H and the condensed steam is forced by feed pipe J through a check valve *j* into the boiler as feed water, or if desired the condensed steam may be forced through a pipe K having a valve *k*, into the water tank on the tender. If the valve *k* is closed the feed water passes into the boiler.

N is a cold water pipe connecting the supply or water tank with the suction pipe H or I and is provided with a valve *n*. When this valve *n* is opened cold water is drawn into the suction pipes where it aids in the condensation of the steam creating a more positive vacuum and is forced in its heated condition by the pump either into the boiler or back into the tank raising the temperature of the feed water contained therein. It is evident that in locomotives in which the water tank is carried by the locomotive itself these pipes connecting with the water supply would be connected directly and without the mediation of couplings.

O represents the usual Westinghouse air compressor and its exhaust may be connected by a pipe P with the suction pipe G supplying steam to the heating system as in the case of the exhaust from pump D.

R is the pipe provided with a valve *r* and connecting also with the steam supply pipe G and receiving steam from the exhaust nozzle S of the locomotive and would be used in cold weather when the supply of steam from the pump D would not be sufficient. In the case of the locomotive or vehicle upon which the heating and circulating apparatus is supported, each end of the supply and suction pipes G and H is provided with valves *g* so that either end may be coupled to cars or vehicles and the other ends closed or both ends may be coupled to separate cars or vehicles. Hot water might be circulated in this manner with or without admixture with steam and thus heat the cars or vehicles in the same way. In practice much of the steam is condensed and circulates as water.

The essential feature of this invention consists in separate cars provided with steam heating coils or radiators connecting with steam supply and suction pipes, two or more of such cars being adapted to be coupled together and receive their supply of steam from a common source, combined with a vehicle upon which is located suitable vacuum creating devices adapted to draw a supply of steam and condensed vapor from the suction pipe, and a source of steam connecting with a supply pipe to furnish preferably low pressure to the system.

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

1. The combination of one car truck or vehicle provided with steam supply and vacuum creating devices, supply and suction pipes the former connecting with the steam supply and the latter with the vacuum creating devices, with another vehicle, car or truck provided with steam heating coils or radiators, and supply and suction pipes connecting with said heating coils and communicating with the steam supply and suction creating devices whereby low pressure steam is caused to circulate through the system of pipes receiving its motive force from a vehicle other than that to be heated and flexible coupling devices to connect respectively the supply and suction pipes on the two vehicles substantially as and for the purpose specified.

2. The combination of one or more cars, trucks or vehicles provided with steam supply and vacuum creating devices supply and suction pipes the former connecting with the steam supply and the latter with the vacuum creating devices with another vehicle car or truck provided with steam heating coils or radiators and supply and suction pipes connecting with said heating coils and communicating with the steam supply and suction creating devices by disconnectible couplings, those on the rear end of the rear car being coupled together to unite the supply and suction pipes whereby low pressure steam is caused to circulate through the system of pipes receiving its motive force from a vehicle other than that to be heated substantially as and for the purpose specified.

3. The combination of one car truck or vehicle provided with steam supply and vacuum creating devices supply and suction pipes the former connecting with the steam supply and the latter with the vacuum creating devices with another vehicle car or truck provided with steam heating coils or radiators, and supply and suction pipes connecting with said heating coils and communicating with the steam supply and suction creating devices and supplied with suitable valves to control the quantity of steam required to pass through the heating coils, whereby low pressure steam is caused to circulate through the system of pipes receiving its motive force from a vehicle other than that to be heated substantially as and for the purpose specified.

4. A car or vehicle provided with heating or radiating steam pipes or coils, steam supply and suction pipes communicating respectively with the ends of said heating coils; the ends of said steam supply and suction pipes being provided with coupling devices whereby they may be coupled with corresponding pipes on another car or vehicle substantially as and for the purpose specified.

5. A car or vehicle on wheels, having steam heating pipes or coils, a steam supply pipe, and a suction pipe communicating respectively with the ends of said heating pipes or coils and in which the ends of said supply and suction pipes terminate at the extremities of the car or vehicle, and flexible couplings on the ends of each of the pipes adapted to couple with each other or with similar couplings on another similarly equipped car or vehicle.

6. The combination of a car, a steam sup-

ply pipe and a suction pipe extending longitudinally on the car and terminating in each end in couplings for connection with similar pipes on other cars or locomotive, heating coils connecting between the said supply and suction pipes and arranged within the car in multiple, valves in said supply and suction pipes for controlling the passage of steam therein, a locomotive, a steam pipe leading from the locomotive to the supply pipe of the car, a valve in said steam pipe to control the supply of steam to the car, a vacuum creating pump operated by steam from the locomotive, and a suction pipe leading from the suction pipe of the car to suction port of the pump.

7. A locomotive combined with a vacuum creating pump supported on the locomotive and provided with a coupling for adjustment to a steam pipe on a car, said supply connecting with the exhaust of the locomotive, and a suction pipe also carried by the locomotive having its rear end provided with a coupling for connection with a corresponding suction pipe on a car and having its other or forward end connected with the suction of the vacuum pump, and a steam pipe leading from the boiler of the locomotive to the vacuum creating pump and provided with a controlling valve.

8. A locomotive provided with a vacuum creating pump or its equivalent steam supply and suction pipes provided on one or both ends with couplings the suction pipe communicating with said vacuum pump and the steam supply pipe communicating with a steam source and a pipe connecting the discharge port of the suction creating pump with the boiler whereby the condensed water is forced into the boiler substantially as and for the purpose specified.

9. A locomotive provided with a vacuum creating pump or its equivalent, steam supply and suction pipes provided on one or both ends with couplings the suction pipe communicating with said vacuum pump and the steam supply pipe communicating with a steam source and a pipe connecting the discharge port of the suction creating pump with the boiler whereby the condensed water is forced into the boiler and a cold water supply pipe connecting with the suction pipe substantially as and for the purpose specified.

10. A locomotive provided with a vacuum creating pump or its equivalent steam supply and suction pipes provided on one or both ends with couplings the suction pipe communicating with said vacuum pump and the steam supply pipe communicating with a steam source and a pipe connecting the discharge port of the suction creating pump with the boiler whereby the condensed water is forced into the boiler and a cold water supply pipe connecting with the feed pipe and the cold water supply substantially as and for the purpose specified.

11. A traveling vehicle on wheels having a compartment for passengers, steam heating pipes or coils in said vehicle, a steam supply pipe for said heating pipes or coils, a source of steam supply, a suction pipe from the return end of the coils or heating pipes, and a vacuum creating device for creating a vacuum in the suction pipe and heating pipes or coils for circulating the steam below atmospheric pressure, the said vacuum creating device, source of steam supply, and supply, suction and heating pipes being carried by and moving with the said vehicle on wheels.

12. A car or vehicle having a steam vacuum creating pump or its equivalent steam supply and suction pipes having couplings on one or both ends, the supply pipe being connected with the exhaust of the engine and the suction pipe being connected with the vacuum creating cylinder in combination with a vehicle or car provided with heating or radiating steam pipes or coils, steam supply and suction pipes communicating respectively with the ends of said heating coils, the ends of said steam supply and suction pipes being provided with coupling devices whereby they may be coupled with corresponding pipes on another car or vehicle, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

NAPOLEON W. WILLIAMES.

Witnesses:

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