2 Sheets—Sheet 1.

L. T. WHITE.
Car-Heater.

No. 196,961. **Patented Nov. 6, 1877.**

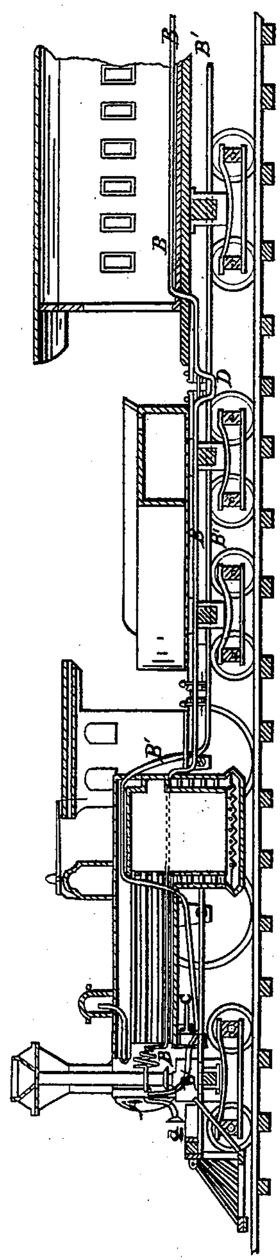

Fig. 1.

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2 Sheets—Sheet 2.

L. T. WHITE.

Car-Heater.

No. 196,961. **Patented Nov. 6, 1877.**

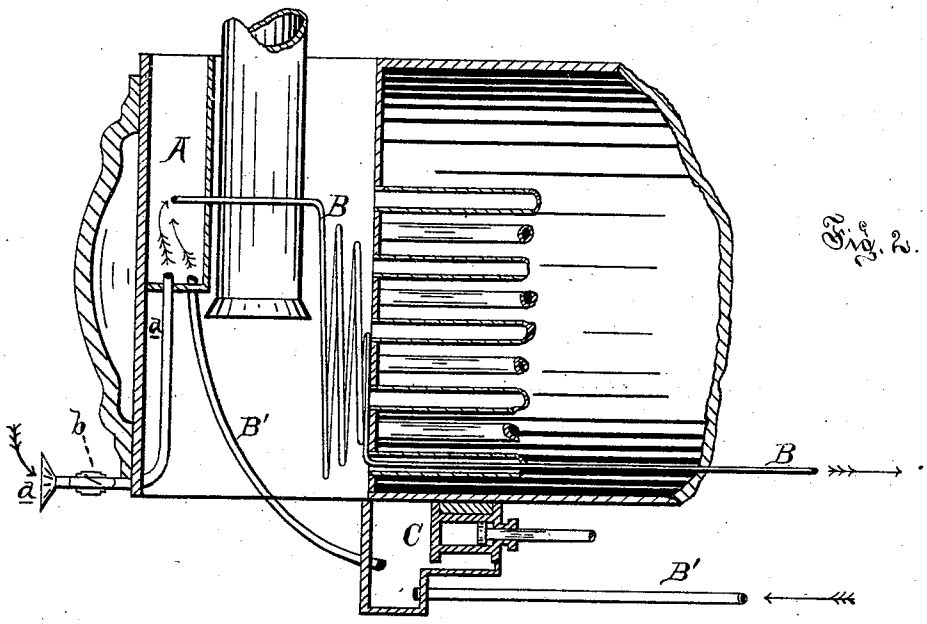

Fig. 2.

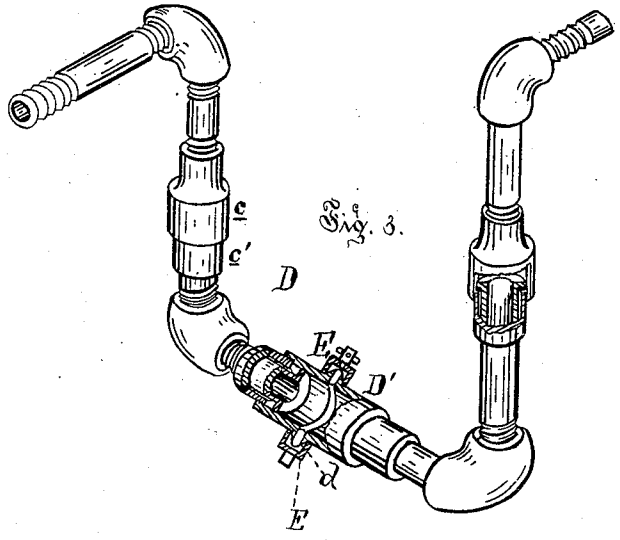

Fig. 3.

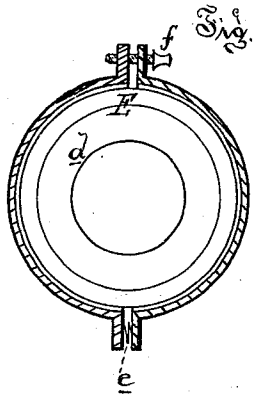

Fig. 4.

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UNITED STATES PATENT OFFICE.

LYMAN T. WHITE, OF EATON RAPIDS, MICHIGAN, ASSIGNOR TO MARY E. WHITE, OF SAME PLACE.

IMPROVEMENT IN CAR-HEATERS.

Specification forming part of Letters Patent No. **196,961**, dated November 6, 1877; application filed March 15, 1877.

To all whom it may concern:

Be it known that I, LYMAN T. WHITE, of Eaton Rapids, in the county of Eaton and State of Michigan, have invented a new and useful Method of Heating and Ventilating Railway-Trains, of which the following is a specification:

The object I have in view is to utilize the waste heat resultant from the combustion of fuel in the furnace of a passenger-locomotive and make it available for heating the cars of a passenger-train, by causing it to circulate through coils of pipe arranged in the several cars; and my invention therein consists, mainly, in the combination of a hot-air pipe through which the air is forced into pipes extending throughout the train, a steam-driven air-pump, and a return-pipe, for conveying the air back to the locomotive to be reheated, so as to utilize the heat to the greatest advantage; and, further, in the combination and arrangement of the several parts composing my apparatus, all as more fully hereinafter explained.

Figure 1 is a longitudinal vertical section of a locomotive and one car, showing my heating devices. Fig. 2 is an enlarged sectional detail of the coil and air-chambers in the smoke-box. Fig. 3 is a sectional perspective view of the pipe-coupling between the cars. Fig. 4 is a cross-section of the same.

In the drawing, A represents an air-chamber, placed in the front part of the smoke-box of a locomotive-boiler, and from which a metal pipe, B, issues at the lower part, passing back through one of the lower flues of the boiler; thence through the fire-box, or, if preferred, through the water-leg, or, again, through a water-jacket in the furnace; thence back under the tender into the first car in the train, and thence through the several cars to the rear end thereof, it being united, as it passes from car to car, by a coupling hereinafter described. The pipe is spirally coiled in the smoke-box in front of the flues, in order to be heated by the waste gases and flame issuing from them.

At the rear end of the train the pipe B is united, by means of said coupling, with a return-pipe, B′, on the other side of the car, extending in like manner to the front end of the train, passing under the foot-plate of the locomotive and up through the cab, where it is provided with a thermometer to indicate the temperature of the return-current; thence to a suction and force pump, C, located under the front part of the barrel of the boiler, the purpose of which pump is to exhaust the air from the pipes B B′, and force it back into the air-chamber A, and thus force the circulation of air through the train inside said pipes, which are formed into manifold coils under the seats of the passenger-coaches, and into wall-coils in the baggage-cars.

The air in the pipes, where they are exposed to the action of the flames, and also that in the chamber A, becomes highly heated, and as it passes through the pipes in the train gives off its heat by radiation.

The air-pump may be an ordinary direct-acting device of the usual construction, driven by live steam or by exhaust steam; but in either case, under the control of the engineer, who regulates its speed accordingly as more or less heat is required in the train, being guided by the temperature of the return-currents as read off the thermometer in the cab.

As the temperature in the chamber A falls, and the air therein becomes denser, fresh air is admitted thereto through a pipe, *a*, at the front of the boiler, provided with a self-acting valve, *b*, which opens whenever the pressure of the external atmosphere exceeds that within the chamber A, and thus admits the necessary volume of air thereto.

If desired, the return-pipe B′ may pass through the water in the locomotive-tender in a coil, and thus raise the temperature of the feed-water.

The coupling D is composed of three short nipples, coupled by four elbows into the line of pipe. Each nipple is cut in two, and the two halves are coupled together by a running-socket, *c*, or one screwed upon a flanged union, *c′*, slipped upon the flanged end of the other half of the nipple, on which it is free to rotate axially, while leakage at the union is prevented by packing the joint. This form of coupling enables the end nipples to approach or recede as the cars play back and forth.

The middle coupling D′ is cut in two and

bevel-flanged at the meeting ends, with an interposed packing-ring, *d*. These flanges are clasped by a double-flanged ring, E, cut in two parts, joined at one side by a spiral spring, *e*, and at the other by a screw, *f*, passing through lugs at the ends of the section.

The screw *f* compresses the parts of the ring together, so that the spring will resist a moderate given longitudinal strain, sufficient to hold the two parts together under the usual tension of the train, but not if the cars should break their couplings, in which case the ring-sections will spring apart and let one of the flanges pass out.

To use the system for summer ventilation, by forcing jets of fresh air into the several cars, the pipes should be perforated inside the cars at intervals, with a sleeve to slide over each opening in winter. The air-pump should then have reversible valves, and its inlet be disconnected from the coils in the smoke-box. It can then be used to force air through the pipes into the train.

At terminal stations, and places where locomotives are changed, to heat the train when standing disconnected from the locomotive, the pipes are to be connected to a local air-heating furnace, through which circulation is effected by a steam or hand pump, the connection with the train-pipes being made with flexible tubes.

What I claim as my invention is—

1. In apparatus for heating railway-cars, the combination, with a locomotive-engine, of the pipe B, heated by the hot gases of combustion issuing from the flues of the locomotive-boiler, the return-pipe B′, a suitable connecting box or chamber, and the steam-driven air-pump C, whereby a constant stream of hot air is forced through pipes extending throughout the train and returned to the locomotive to be reheated, substantially as described.

2. In apparatus for heating railway-cars, the combination, with a locomotive-engine, of the hot-air chamber A, hot-air pipe B, return-pipe B′, air-pump C, and air-supply pipe *a*, substantially as described and shown.

LYMAN T. WHITE.

Witnesses:
PHILIP LEONARD,
O. M. FROST.