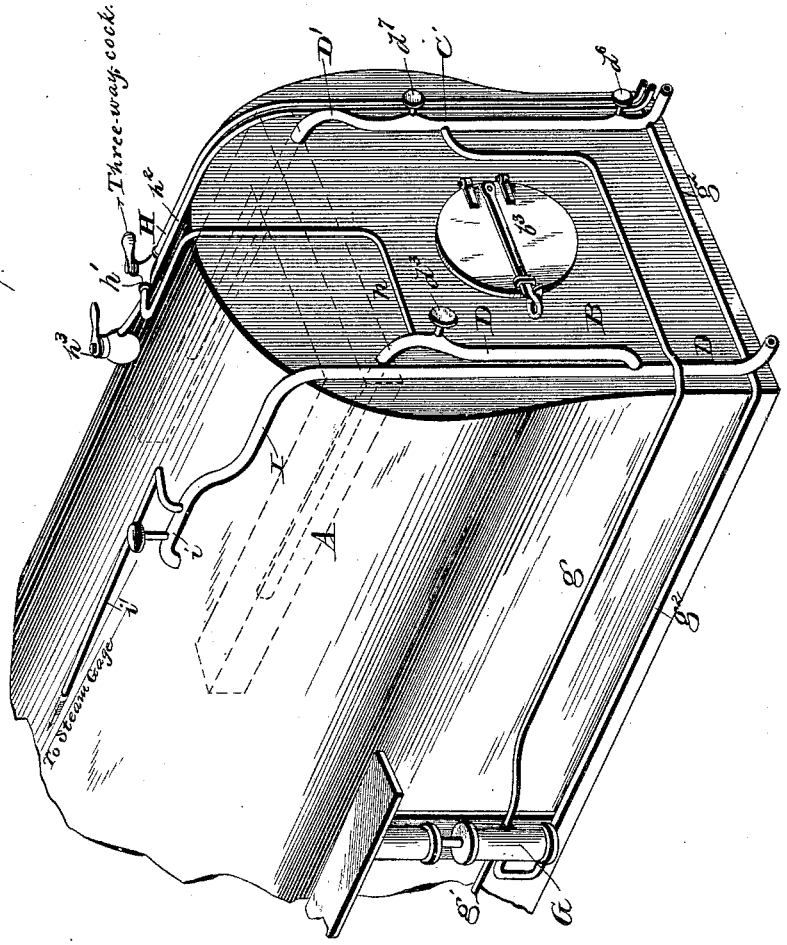
(No Model.) 3 Sheets—Sheet 1.

H. M. BELL & W. ARMSTRONG.

RAILROAD CAR HEATER.

No. 423,369. Patented Mar. 11, 1890.

Fig. 1.



WITNESSES
F. L. Ourand
Severance

INVENTORS,
Harrison M. Bell and
William Armstrong,
By L. Deane
Attorney

(No Model.) 3 Sheets—Sheet 2.

H. M. BELL & W. ARMSTRONG.

RAILROAD CAR HEATER.

No. 423,369. Patented Mar. 11, 1890.

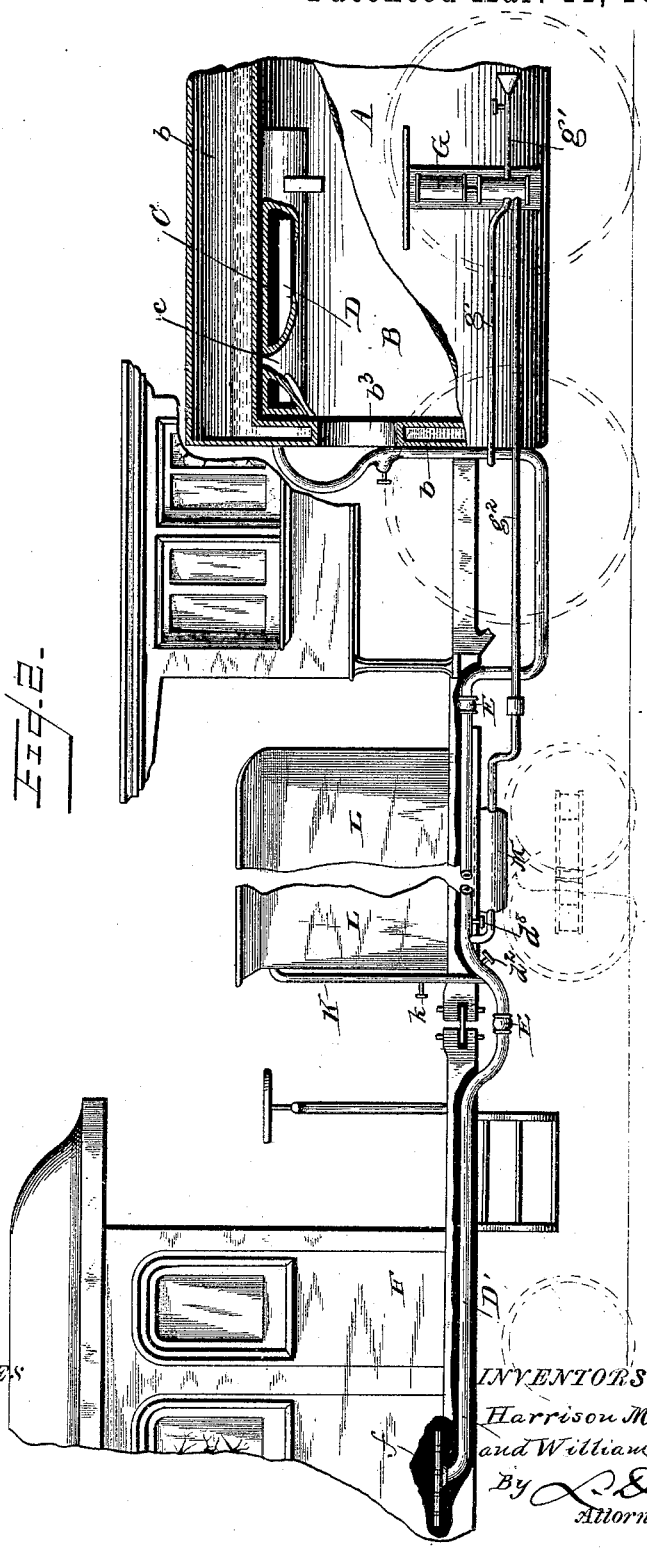


Fig. 2.

WITNESSES
F. L. Ourand.
Geverance

INVENTORS,
Harrison M. Bell
and William Armstrong,
By L. Deane
Attorney

(No Model.) 3 Sheets—Sheet 3.

H. M. BELL & W. ARMSTRONG.

RAILROAD CAR HEATER.

No. 423,369. Patented Mar. 11, 1890.

Fig. 3.

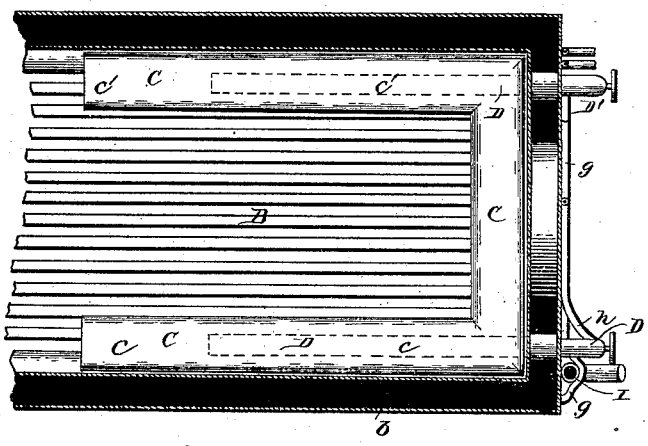


Fig. 4.

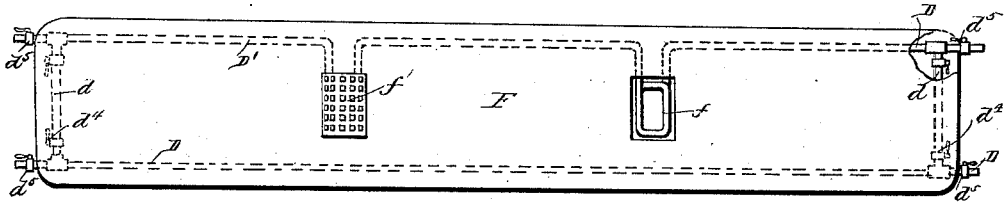
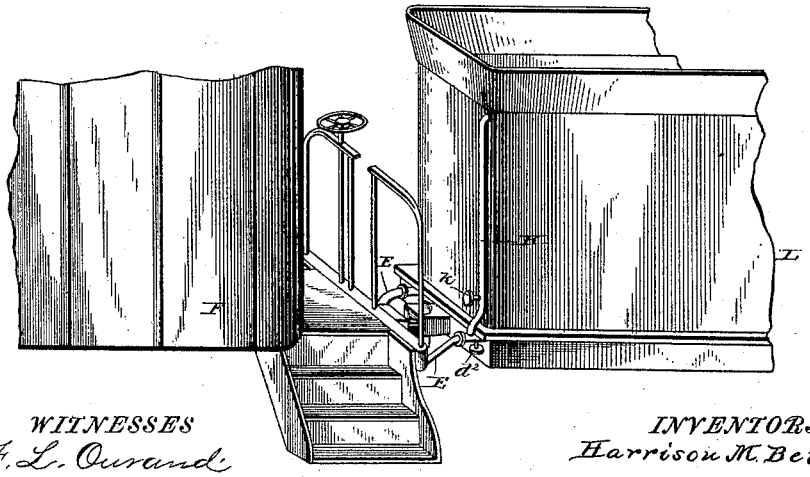


Fig. 5.



WITNESSES
F. L. Ourand.
Geverauce.

INVENTORS,
Harrison M. Bell, and
William Armstrong,
By L. Deane
Attorney

UNITED STATES PATENT OFFICE.

HARRISON M. BELL AND WILLIAM ARMSTRONG, OF MARTINSBURG, WEST VIRGINIA.

RAILROAD-CAR HEATER.

SPECIFICATION forming part of Letters Patent No. 423,369, dated March 11, 1890.

Application filed October 25, 1889. Serial No. 328,285. (No model.)

To all whom it may concern:

Be it known that we, HARRISON M. BELL and WILLIAM ARMSTRONG, citizens of the United States, residing at Martinsburg, in the county of Berkeley and State of West Virginia, have invented certain new and useful Improvements in Railroad-Car Heaters; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to improvements in railroad-car heaters; and it consists in the construction and novel combination of parts hereinafter described, and pointed out in the appended claims.

Figure 1 of the drawings is a perspective view of the fire-box of a locomotive with part of an apparatus illustrating the invention attached. Fig. 2 is a side elevation of a portion of a train to which this invention is applied, the locomotive being partially in section to show the heating-chamber in the fire-box. Fig. 3 is a horizontal section of a part of the locomotive, showing the heating-chamber in the fire-box. Fig. 4 is a plan view of the floor of a car with the invention attached. Fig. 5 is a perspective view of parts of a car and tender to which the invention is attached.

The invention is of that class of heaters in which the heat is derived from the fire-box of the locomotive, and is thence conducted in piping to the cars; but in the present instance steam from the boiler, when necessary or desired, may be substituted for the heating agent. In this case there is in the combustion-chamber a hot-air chamber closed except where it communicates with the pipes that extend from it to the cars, which pipes enter said chamber on either side and constitute, respectively, the ducts for the air that flows into and out of the hot-air chamber. The said pipes are connected by cross-pipes beneath the floor of each car and complete the system of heat-radiating pipes beneath the floor. The air thus flows from the hot-air chamber through one duct, passes into the radiating-tubes in each car, and returns to the hot-air chamber through the opposite duct, the circulation being kept up by an air-pump in the system of piping which receives air from the return-duct and forces said air, which has been cooled in the circuit, into the hot-air chamber and thereout through the outgoing duct. The said pump can also force air from outside into the heating-chamber when the air therein has been permitted to escape into the brake apparatus or otherwise withdrawn, and certain additions, hereinafter described, are attached to the ducts, whereby steam may be caused to flow therethrough instead of hot air.

Referring to the drawings by letter, A designates a part of the boiler of a locomotive; B, the fire-box; *b*, Fig. 3, the usual steam-space, and b^3 the door of the fire-box. In the fire-box, preferably in the crown, is secured the horizontal hot-air chamber C, of suitable shape, but preferably having that shape shown in the drawings, in which the central part of said chamber crosses the front part of the fire-box transversely, and is provided with the arms *c c'*, which stand at right angles from its ends, as shown. The said chamber C is entirely closed, except where the air-ducts, hereinafter described, enter it.

D D' are opposite air-ducts, which pass through openings in the front wall of the fire-box and respectively project into the arms *c c'* of the chamber C. Each duct D D' descends on the outside of the wall of the fire-box and is respectively provided with a cut-off cock or valve. Thus the duct D has the valve d^3 and the duct D' the valve d^7, and each pipe passes under the bottom of the tender and cars, as shown, the ducts being connected beneath the floor of the cars near the ends thereof by the pipes *d*, provided with suitable stop-cocks d^4. The ducts are also provided with stop-cocks d^5, situated to the outside of the tubes *d* in each car, as seen in Fig. 4.

E are the couplings for the sections of the ducts between the cars, and *f* is a chamber just below the floor of the car F, Fig. 4, containing a tubular radiator connected in the outgoing duct D. The said radiator is covered by a register *f'*, to regulate the flow of heat into the car in the ordinary well-known manner.

G is an air-pump communicating with the

return-duct D′ below its stop-cock d^6, and arranged and constructed to draw the air out of said duct and force it into the hot-air chamber C. The pressure in said chamber caused by the pump forces the heated air out through the duct D to the radiators in the cars. By means of the pipe g^2, connecting the return-duct from the train, the returned air is taken again by the pump and forced through the pipe g to the return-duct D′, and thence to the heater and system. To accomplish this it is necessary to provide a cut-off d^6 in the pipe D′ at a convenient point between the junction of the pipes g g^2 with the pipe D′.

An air-reservoir M, located, as now shown, under the tender, may be used to receive the air returned from the pipes, from which reservoir, by closing cock d^3, (see Fig. 2,) air may be drawn by the pump instead of directly from the pipe D′.

When there are a number of cars in the train, the cocks d^5 of the ducts or pipes D D′ in rear of the last car must be closed and the cocks d^4 of the rear pipe d of said car must be opened, while all the other cocks d^5 of the ducts or pipes D D′ must be opened and all the other cocks d^4 must be closed, else the circulation will not reach to the end of the train.

The pump G is provided, in any usual or well-known way, with an automatically-acting valve, whereby the supply of air to the heating system is automatically regulated. When sufficient air has been thus introduced, a pressure-valve in the pump will close and prevent the entrance of more.

If desired to thaw out the valve h' of the braking apparatus or warm and loosen any clogging matter gathered there, communication can be had between said valve and the pipe D by means of the pipe h.

The means whereby the hot-air ducts communicate with the brake apparatus is as follows: h^2 designates the usual brake-pipe in the Westinghouse system, and H the hot-air pipe used to brake with when the Westinghouse valves have become clogged. h^3 is the usual engineer's brake-valve. The pump G, being similar to the Westinghouse pump, exerts the same amount of pressure. The connection between the hot-air and the braking system is made through the pipe h, which is a pipe extending from the outgoing duct D to a stop-cock h' at the upper end of the pipe H. By opening this cock hot air from the duct D and the hot-air chamber may be driven into the brake-pipes to operate the brakes.

The means for using steam to heat the cars in place of hot air is as follows: I, Fig. 1, is a steam-duct connecting with the outgoing air-duct D, as shown, and passing into the steam space or dome of the boilers. The said steam-duct being provided with the stop-cock i and connecting with the steam-gage through a pipe i', when the cock d^3 of the duct D is closed and the cock i of the duct I is opened, it is evident that hot air will be cut off from circulating in the ducts and its place will be taken by steam.

K is a pipe rising from the duct D′ in rear of the tender, with its upper end opening into the water-space thereof and provided with the stop-cock k, the duct D′ having the stop-cock d^2 in front of said pipe. When using steam, the cock d^2 is closed and the cock k opened, so that the cooled steam and water of condensation returning through the duct D′ will be discharged into the water in the tender and not be forced into the hot-air chamber.

The hot-air chamber is preferably of cast-iron or steel about one inch thick, and the ends of the ducts within said chambers are preferably of steel.

The hot-air chamber is secured within the fire-box by any suitable means, but preferably by brackets of the same material and power of resistance as that of the said chamber.

The shape and position of the tubular radiators may be varied to suit circumstances.

Heretofore there have been attempts made to heat a system of pipes in railroad-cars by placing a coil of the pipe in the fire-box of the locomotive; but this was objectionable, because too small an amount of air is heated in this way, and because it was not found possible to expose any such tubing to the intensest heat of the fire-box without soon destroying them. In our device the hot-air chamber is of ample size to afford a comparatively large reservoir for air heated to a very high degree, and the material, preferably of cast-iron or steel, of which the chamber is made insures the greatest durability. The chamber is so made and located that it does not in any considerable degree interfere with the proper heating action of the fire on the boiler. The chamber is, by means of its structure and form, made very durable and will easily sustain the intensest heat of the fire-box.

Having described our invention, we claim—

1. In a car-heater, the combination of the air-heating chamber, consisting of the transverse part extending across the front of the locomotive fire-box and the arms c c', extending from the transverse part along the sides of said fire-box, with the circulating-ducts D D′, which extend into said arms c c', respectively, substantially as described.

2. In a car-heating apparatus, the combination of the hot-air chamber in the crown of the fire-box, the circulating-duct D, having cocks d^3, and duct D′, provided with cocks d^2 and d^i, and the connecting-pipes d, communicating with said ducts D D′ and forming a circuit, the steam-pipe I, communicating with said duct D, the pipe K, having cock k, and providing communication between the duct D′ and the tank of the tender, whereby the cars may be heated by either air or steam, substantially as set forth.

3. In a car-heating apparatus, the hot-air

chamber C in the fire-box of the locomotive, consisting of the transverse part across the front of the locomotive and the arms *c c'*, extending therefrom along the sides of the fire-box, combined with the circulating-ducts D D', extending into said arms and thence beneath the cars of the train, and the pump G, having pipes *g g²*, connecting with said ducts D D', and suitable valves and cut-offs in the system, substantially as and for the purposes set forth.

4. In a car-heating apparatus, a hot-air chamber in the fire-box, a circuit including the pipes extending through the train, a pump in said circuit, having also a valved communication with the outer air, the pipes of the braking apparatus, and a pipe *h*, leading from the circuit of pipes near the heater to the brake-pipe valves for shutting off the flow of air through the circuit, and a three-way cock *h'* at the junction of the brake-pipe and the pipe *h*, all of said parts combined substantially in the manner and for the purposes set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

HARRISON M. BELL.
WILLIAM ARMSTRONG.

Witnesses:
JAMES C. FRAZER,
JOHN FARRIN.