(No Model.)

B. PRICE.

HEATING APPARATUS.

No. 588,601. Patented Aug. 24, 1897.

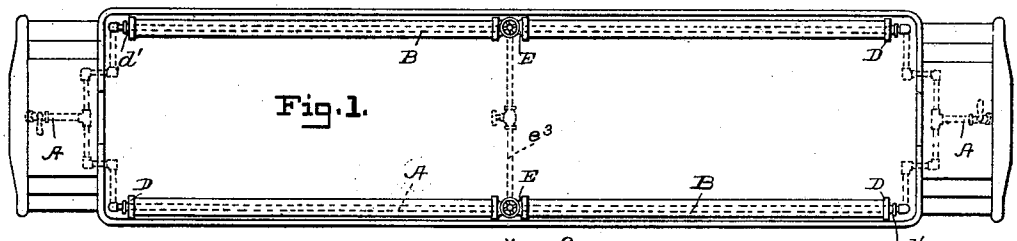


Fig. 1.

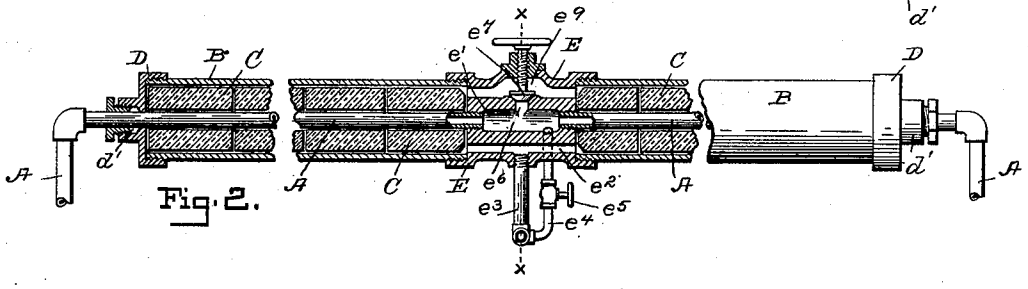


Fig. 2.

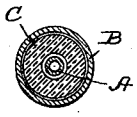


Fig. 5.

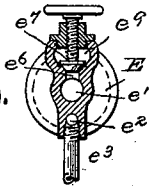


Fig. 3.

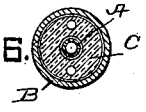


Fig. 6.

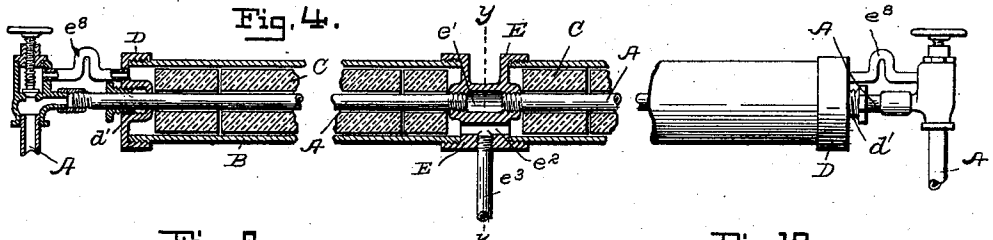


Fig. 4.

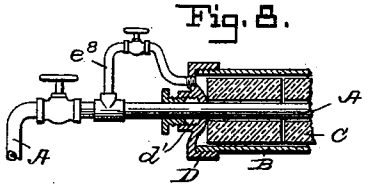


Fig. 8.

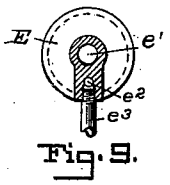


Fig. 9.

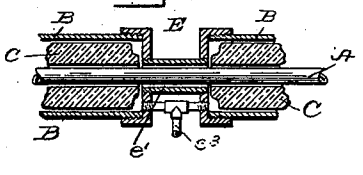


Fig. 10.

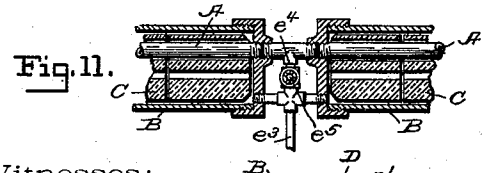


Fig. 11.

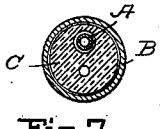


Fig. 7.

Witnesses:

A. O. Babendreier.

H. MacCarthy.

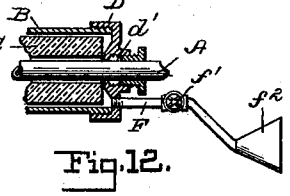


Fig. 12.

Inventor.

Benjamin Price

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UNITED STATES PATENT OFFICE.

BENJAMIN PRICE, OF BALTIMORE, MARYLAND.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 588,601, dated August 24, 1897.

Application filed June 6, 1894. Serial No. 513,619. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN PRICE, of the city of Baltimore and State of Maryland, have invented a new and useful Improvement in Heating Apparatus Designed for Railway-Cars or other Compartments, of which the following is a complete specification.

The accompanying drawings illustrate the invention, of which—

Figure 1 is a plan view illustrating the invention as applied to a railway-car, showing two pipes or radiators connected together by a double head and the train-pipe running through them; Fig. 2, side view of the heater at one side of the car, partly in section; Fig. 3, a cross-section of the double head on line *x x* of Fig. 2; Fig. 4, also a side view, partly in section, showing the steam-inlet arranged at the outer ends of the radiator instead of centrally and the ends of train-pipe secured in the double head. Figs. 5, 6, and 7 represent forms in cross-section of the heater or radiator. Fig. 5 is a cross-section showing the radiator with the inclosed perforated heat-absorbing substance and heat-supply pipe within the perforation, leaving an annular space between the two for the passage of the heating agent. Fig. 6 is a sectional view of the same, showing in addition thereto two smaller perforations to facilitate the passage of the heating agent. Fig. 7 is a view of the same with the perforation for the heat-supply pipe located at one side of the center and a single small additional perforation to facilitate the passage of the heating agent. Fig. 8 is a sectional view of one end of the radiator or heater, showing the train-pipe and its connections with the heater; Fig. 9, a cross-section of double head on line *y y* of Fig. 4. Fig. 10 is a longitudinal sectional view of the double head secured to the ends of the radiator, also in longitudinal section and broken away, and showing the drain-pipe passing through the double head and the aperture and the heat-absorbing brick. Fig. 11 shows the double head in longitudinal section, the ends of the heater also in section, a drain-pipe passing through the upper part of the heat-absorbing brick, and an additional aperture through the brick, as shown in cross-section in Fig. 7. Fig. 12 is a view of one end of a radiator, showing the tubing, cap, and heat-absorbing block in longitudinal section and also showing in full lines a cooling-pipe entering the cap of the heater.

When heating-radiators are used which consist of a tubular heater running through the car longitudinally and generally placed at one side along the wall of the car, it is usual to provide, in addition to the radiator, a steam service-pipe, called in railway parlance a "train-pipe," and the office of this pipe when used on railway-trains is to conduct the heating agent to each of the cars. This train-pipe may be connected with a stationary supply of hot air or steam, or with the boiler of the locomotive if the device is used on railway-cars, and as it communicates by means of suitable couplings between the cars of the train or other compartment provision is usually made to leave the pipe free to communicate with adjoining cars and cut off only the radiator connections in such compartment or car as may be required. The train-pipe, however, may also be provided with valves between the apartments. For these reasons a train-pipe is desirable and railroads generally require them. But there are objections urged to the forms above described, viz: Where the train-pipe is wholly or in great part located outside of the car, the pipe is liable to great condensation of the steam in cold weather, and to provide against this an asbestos wrapping or other means has been suggested to prevent the pipe from freezing and bursting. Such arrangements, however, are not entirely successful and are costly. Besides this, the steam is not conveyed to the radiator as hot as it is when the train-pipe is within the car and unexposed to the weather outside, and consequently there is more condensation in the radiator and requires a longer time to heat it. When the train-pipe and radiator are both side by side within the car, this train-pipe radiates a good deal of heat, and frequently when the car is overheated already this overheating occasions a very free use of the car-ventilators to cool it off, subject to the objections of passengers to the draft which these ventilators generally produce.

One of the objects of my invention, therefore, is to procure an efficient tubular heating apparatus located within the car and

while still retaining the train-pipe also within the car and at the same time inclose it within the radiator in position to communicate its heat thereto or to cut it off when such heat is not required.

Another object of my invention is to provide a device economical in its construction and avoid unnecessary joints, connections, or fittings; and still another feature of my invention is to provide a cooling device whereby the cooler air is admitted directly within the heater to reduce its temperature and thereby regulate the temperature of the compartment as required.

Viewing Fig. 1, which represents the floor of a railway-car, A is the ordinary pipe which connects with adjoining cars or compartments and may be provided with suitable couplings therefor and also with a source of heat-supply, which may be hot air or steam. Such source may be stationary, or, as is usual when used in railway-service, the pipe may be connected with the boiler of the locomotive. This pipe is known in railway parlance as the "train-pipe," and will be called by this name throughout the specification, whether the same be applied to compartments or cars. At the point shown in Fig. 1 marked A this pipe crosses a short distance beneath the platform and then extends upwardly through the floor of the car on either side, leaving but a small part of the pipe exposed, and at this part there is usually a fall or drop in the pipe, as shown in Figs. 2 and 4, wherein the water of condensation may fall and be drained off by suitable devices for that purpose.

In Fig. 2 is shown the heater or radiator, which I have preferred to construct after the method used by the Morton Safety Heating Company, which consists, in short, of a cylindrical metallic casing inclosing a perforated brick of terra-cotta, earthenware, or other heat-retaining substance.

In the drawings as the invention is illustrated, B represents the casing, and C the inclosed heat-retaining substance, the whole constituting the heater or radiator. When the radiator is thus constructed, with the heat-supply pipe passing through the perforation in the heat-retaining substance, the perforation should be large enough to readily admit the passage of the pipe and leave a space for the passage of the heating agent around it when admitted thereto direct. Thus the heat-supply pipe keeps this space and the surrounding substance warm when the heating agent is cut off therefrom, and the surrounding substance aids in keeping the supply-pipe warm by radiation therefrom, and coöperating with each other they retard the cooling of the heater. As shown in Figs. 2, 4, 10, and 11, the two pipes on the sides of the car are connected together about centrally of the car and are provided with devices for passing the heating agent directly therethrough and into the next adjoining car, except upon the rear of the last car of the train. These devices, with pipe A, constitute the train-pipe, thus isolating the train-pipe by inclosing it within the heater. The ends of the heater are provided with suitable heads D, which are usually secured by screwing them to the casing; but they may be secured in any other way, and generally the ends adjacent to each other are provided with heads of the same character having the steam and drainage connections fitted thereto by hand; but to connect these pipes together I have devised the double head E, which may be cast in a single piece. This double head is provided with suitable means for securing it to the pipe, and is further provided with a passage-way e', which serves the purpose of a direct conduit for the heating agent or for the pipe which conveys the heating agent. In other words, this passage-way may form a part of the train-pipe or the train-pipe may pass through it. In the former case, as shown in Figs. 2 and 4, the outer ends of this opening through the double head are provided with a thread and the ends of the train-pipe are screwed therein, thus making this opening a part of the train-pipe, and in the other case, as shown in Fig. 10, this opening is large enough to admit the train-pipe to pass directly through it. This double head may also be provided with an opening, as e^2, to serve as a passage-way for the water of condensation from the heater, and communicates with said heater at the bottom, where this water collects, and the pipes may be so arranged as to incline slightly in this direction, as is usual in such cases, and the opening itself may be tapped for the insertion of the drain-pipe e^3. A short pipe also, as e^4, leading from the steam-pipe or passage e' to the drain-pipe e^3 may be provided and furnished with a suitable cock, as e^5, to drain the steam-pipe and be under the control of the attendant. It may also be used to induce a suction through the pipe in connection with the cooling device at the end of the heater hereinafter described.

When it is desired that the heating agent shall enter the heaters at the two adjacent ends, I also provide the double head with the passage-way e^9, as shown in Figs. 2 and 3, and an opening thereto from the train-pipe, as e^6, the latter opening controlled by a suitable cock, as e^7, and in this case the steam or other heating agent passing through the train-pipe may be admitted directly into the heater and cut off at pleasure, and when admitted passes to the other closed end of said heater, condensing in its course and finding its exit as water of condensation through the drain-pipe e^3.

When it is desired to admit the heating agent to the heater through the outer ends thereof, the passage-ways e^9 and e^6 may be omitted from the double head and the same may be cast as shown in Figs. 4 and 9. In the latter case I tap the train-pipe, as shown in Fig. 8, and provide it with the pipe e^8 and furnish the same with a regulating-cock, or,

as shown in Fig. 4, I tap a pipe e^8 into the heads and join this pipe and the train-pipe by a suitable cock to control the passage of the heating agent, and generally give to the pipe e^8 a suitable bend to provide for expansion or contraction. At this end of the heater also I have thought it best to furnish a stuffing-box, as d', in case there should be a difference in the expansion between the large heater and the smaller train-pipe. According to the latter construction the heating agent enters at the outer ends and flows direct to the inner ends of the heater, passing out as water of condensation at the drain-pipe. This construction of heater has many advantages. It enables me to retain the train-pipe, which at all times serves its purpose as such to communicate from one apartment to another or from car to car independently of the heater or radiator, and by inclosing it within the heater it is kept warm by the surrounding heat-absorbing substance, and thereby reduces the condensation in the train-pipe, while the passage of steam through this pipe to adjoining compartments when shut off from the heater keeps the pipe hot and warms the adjacent heat-absorbing substance, thereby reducing condensation in the heater, and both coöperate together to reduce the liability to freezing in cold weather.

The sectional views shown in Figs. 5, 6, and 7 show different forms or modifications of the heater. In Fig. 5 the train-pipe goes directly through the central perforation in the block, and when the heating agent is admitted it finds its way through this perforation or otherwise sufficiently to heat the block. The bore in this block may be twice as large, if required—large enough to pass a train-pipe through even when provided with couplings, and this pipe may be thus coupled together and passed through both sections of the heater and through the double head, as illustrated in Fig. 10, or if the central hole should be small additional perforations may be made in the block, as shown in Fig. 6; nor is it necessary to pass the train-pipe centrally through the heater. It may pass at one side or at the top or through an upper perforation in the block, as shown in Figs. 7 and 11, and so far as this feature of the invention is concerned it may be readily used without the double head and by using the two ordinary heads and connecting the same, as illustrated in Fig. 7. In all of these modifications the same advantages are apparent.

Another part of my invention consists in a cooling device. A construction suitable for this purpose is shown in Fig. 12, by reference to which it will be seen that through the head of the radiator I have inserted a tube F, provided with the cock f'. On the end of the tube is shown a funnel-shaped piece f^2. A similar device may be placed at the other end of the tube, or it may be made simply in the form of a valve-controlled opening in the heater without inserting a tube or pipe. When the radiator has received its steam and the water of condensation has been ejected and the cocks closed, there will probably be a partial vacuum in the radiator, causing the outer air to enter and cool down the heated radiator. When, however, this device is used upon a car, the movement thereof in either direction will force the air into and through the radiator.

When a train is standing still or when the device is used in a compartment, or in case the movement of the train be not sufficient to induce a current of cooler air through the heater, the cock e^5 in the pipe e^4 may be opened and the passage of steam into the drain-pipe e^3 will cause a suction and induce a current of air through the heater, and when steam or other heating agent is let into the heater the opening of this pipe into the drain-pipe will operate to provide a path for the water of condensation through the drain-pipe, as well as for any bank of air within the heater, and insure a filling of the heater with the heating agent. It will be seen that these arrangements may be placed at the outer ends of the heater. It will also be seen that the injector may be used in connection with the cooling device in any arrangement of steam or train pipe, whether the same be located within the heater or outside of it.

What I claim, and desire to secure by Letters Patent, is—

1. In a heating apparatus for compartments, a tubular radiator located wholly within each of the compartments, provided with an inclosed heat-absorbing substance perforated longitudinally to receive a heat-supply pipe, in combination with a heat-supply pipe passing through the perforations in each of the heat-absorbing substances and connected with a source of heat-supply, and valve-controlled connections located within the compartment and joining the heat-supply pipe with the radiator, whereby the heating agent may be admitted from the heat-supply pipe direct to one or more of the heat-absorbing substances in the radiators and be cut off from the others, substantially as described.

2. In a heating apparatus for compartments, a tubular radiator, located wholly within each compartment, provided with an inclosed heat-absorbing substance, perforated longitudinally to receive a heat-supply pipe, and leave an annular space between the two, in combination with a heat-supply pipe passing through the perforation in the heat-absorbing substance and connected with a source of heat-supply, and valve-controlled connections, located outside of the radiator and joining the same with the heat-supply pipe, whereby the heat may be admitted through the annular space to the heat-absorbing substance surrounding the annular space and be cut off by the attendant in the compartment.

3. In a heating apparatus for compartments, a tubular radiator located wholly with-

in each of the compartments, provided with an inclosed heat-absorbing substance perforated to receive a heat-supply pipe, and leave an annular space between the two, in combination with a heat-supply pipe passing through each of said perforations and connected with a source of heat-supply, and valve-controlled connections joining the heat-supply pipe with the radiator, and a valve-controlled drain-pipe for the radiator, substantially as described.

4. In a heating apparatus for compartments, a radiator composed of two sections, formed of tubular pipes, provided on their adjacent ends with a screw-thread, in combination with a double head having a screw-thread at each end adapted to join the two sections of the radiator, and provided with an aperture through the same, properly threaded to receive the end of a heat-supply pipe, and a heat-supply pipe passing through the radiator and secured into the threaded aperture, substantially as described.

5. In a heating apparatus for compartments, a radiator composed of two sections formed of tubular pipes, and a heat-supply pipe passing through the radiator, in combination with a double head joining the sections and formed in a single piece, and provided with a passage-way forming part of a heat-supply pipe, and a passage-way for drawing the water of condensation from the heater.

6. In a heating apparatus for compartments, a radiator composed of two sections formed of two pipes and a heat-supply pipe passing through them, in combination with a double head joining the sections, and formed in a single piece, and provided with a passage-way forming part of the heat-supply pipe, a passage-way for drawing the water of condensation from the heater, and a valve-controlled opening leading from the steam-supply pipe to the drain.

7. In a heating apparatus for compartments, a radiator provided with means for admitting a heating agent thereto and means for cutting it off, in combination with a cooling device consisting of a valve-controlled inlet opening into the radiator and communicating with the outer air, and a valve-controlled opening for discharging the air from the radiator, whereby a current of air is passed through the radiator when the heating agent is cut off, and means for operating the ingress and egress valves located within the compartment.

8. In a heating apparatus, for compartments, a radiator provided with means for admitting a heating agent thereto and means for cutting it off, in combination with a cooling device consisting of a valve-controlled inlet opening into the radiator and communicating with the outer air, and a valve-controlled outlet for the same provided with means for injecting a blast of cooler air through the inlet and outlet, and means for controlling the valves located within the compartment.

9. In a moving vehicle, a radiator provided with a cooling device, consisting of two valve-controlled openings one of said openings adapted to receive a current of outer air into the radiator induced by the movement of the vehicle, and the other adapted to discharge the air, and thereby reduce the temperature of said radiator, and means for actuating the valves located within reach of the attendant of the vehicle.

10. In a heating apparatus for compartments, the combination with a radiator located wholly within the compartment and provided with a heat-supply pipe, and valve-controlled connections between the said pipe and the radiator, of a cooling device, consisting of valve-controlled apertures in said radiator one of which is adapted to receive and the other to discharge a current of cooler air from without, whereby the temperature of the radiator is reduced and means for actuating the valves located within the compartment.

11. In a heating apparatus, the combination with a radiator provided with a valve-controlled heat-supply pipe, a drain-pipe, and connections between the heat-supply pipe and drain-pipe, of a cooling device consisting of a valve-controlled opening in said radiator and a valve-controlled outlet, and means for inducing a current of air through the radiator and drain-pipe actuated by injecting a current of the heating agent through the drain-pipe.

12. In a heating apparatus for compartments, the combination with a radiator having a heat-supply pipe passing through the same, and a drain-pipe connected therewith, of a cooling device consisting of openings in said radiator one for admitting a current of cooler air from without and the other for discharging the same and controlled by valves and means for actuating the same located within the compartment, and means for inducing a current of cooler air therethrough when the valves are opened actuated by a current of the heating agent injected through the drain-pipe.

Signed at Baltimore city, in the State of Maryland, this 23d day of May, A. D. 1894.

BENJAMIN PRICE.

Witnesses:
FELIX R. SULLIVAN,
H. MACCARTHY.