June 7, 1927. 1,631,469

E. P. CHASE

HEATING APPARATUS FOR VEHICLES

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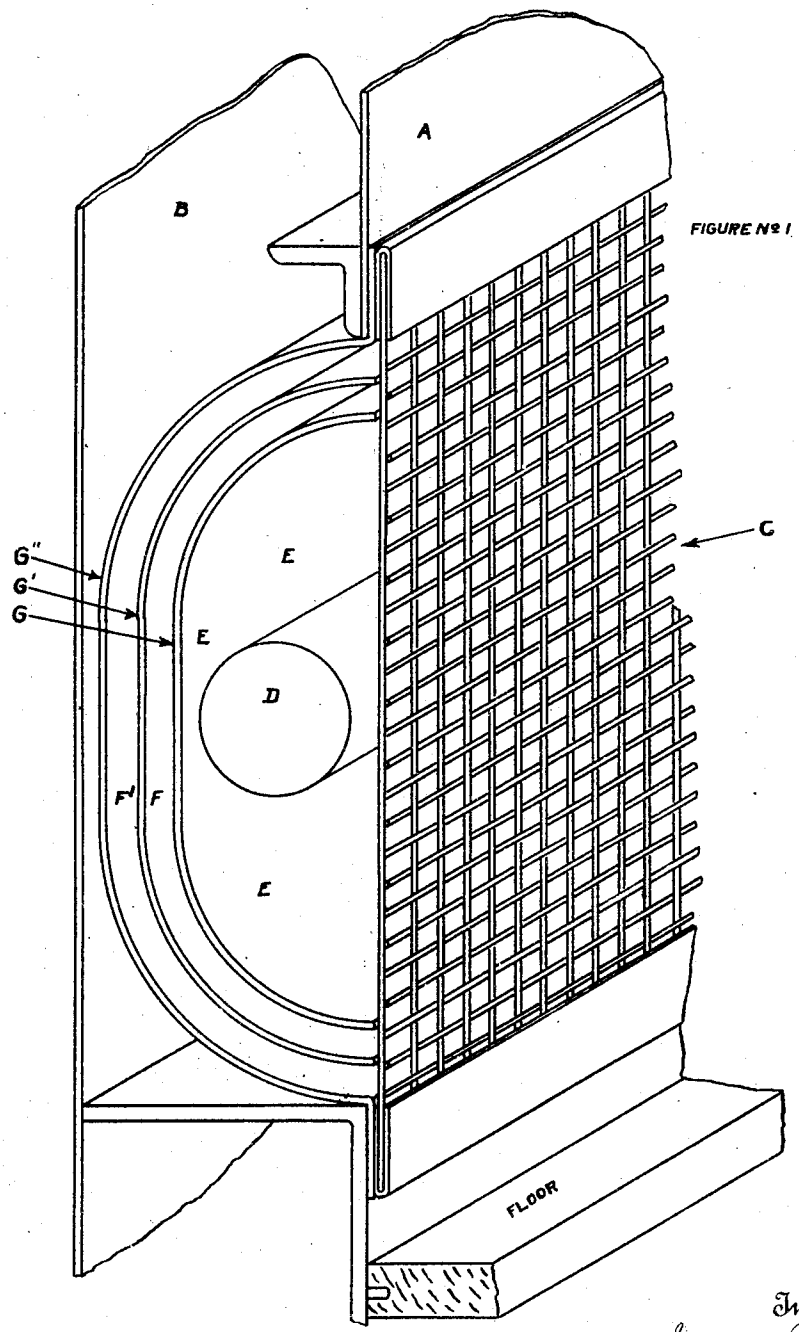


FIGURE No 1

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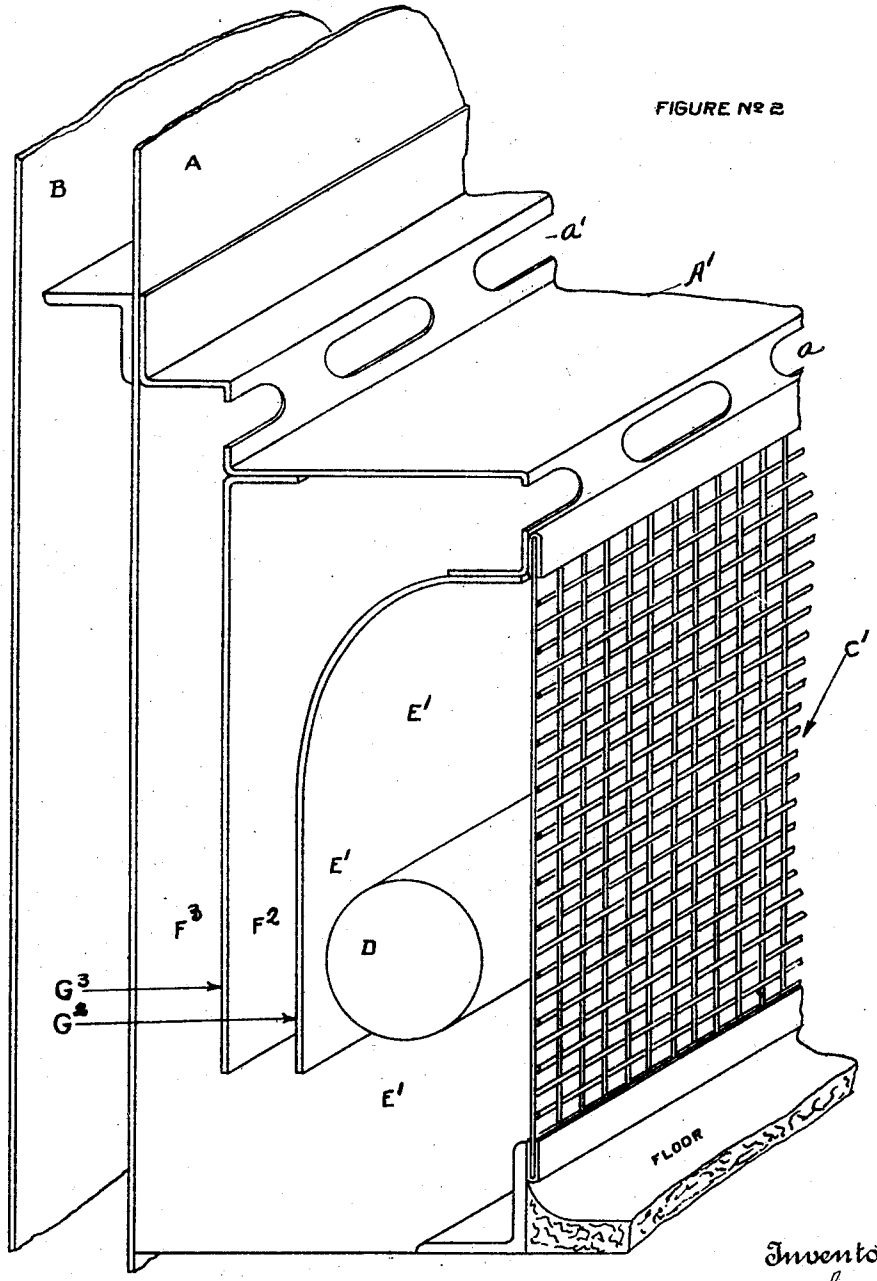
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Filed Sept. 5, 1925 2 Sheets-Sheet 2

FIGURE Nº 2



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Patented June 7, 1927. 1,631,469

UNITED STATES PATENT OFFICE.

EUGENE P. CHASE, OF ALTOONA, PENNSYLVANIA.

HEATING APPARATUS FOR VEHICLES.

Application filed September 5, 1925. Serial No. 54,744.

This invention is designed to improve the heating apparatus for vehicles, such as railway coaches and street cars. With such devices it is desirable for convenience of construction to locate the heating member, steam or electric, near the side walls of the vehicle. In doing this it has been necessary, or at least desirable, to insulate the heating member from the side wall to avoid the serious heat losses that would otherwise result and for this purpose asbestos and various air cell insulators have been used. The materials of such insulation usually deteriorate largely due to the vibration of the vehicle and are also objectionally bulky and in the effort to give a sufficient insulation in the limited space usually available the insulating material may be carried so nearly adjacent to the heating element as to reduce to a considerable extent the effectiveness of the radiating surface of the heating element causing excessive temperatures of the heating element and a consequent reduction in the life of the same.

I have improved the heat insulation for these devices by interposing between the heating member and the wall of the vehicle subjected to the colder temperature a series of passages separated by suitable material, such as metal plates, the passages opening to the vehicle above and below the heating member. This construction permits the entire radiating surface of the heating member to be made effective both for more efficiently heating the car, and for holding the heating element below destructive temperatures, through the ability of the construction to provide sufficient space on all sides of the heating member, and to eliminate the use of insulating material adjacent to the heating element. The heat taken up by the plate nearest the heating member is dissipated and heats the air in the nearest passage to the heating member thus causing a circulation through the passage so dissipating the heat given off by the plate. The higher temperature of the air in the passage communicates heat to some extent to the next adjacent plate and from it to the air in the next adjacent passage, thus creating a circulation in the second passage but of less velocity than in the first passage. A sufficient number of passages is preferably provided to approximately neutralize the flow of air through the passage adjacent to the outer wall of the vehicle. In this way the loss of heat through the side wall of the vehicle is very largely obviated and in a comparatively small space and with a durable construction. Features and details of the invention will appear from the specification and claims.

The invention is illustrated in the accompanying drawings as follows:—

Figure No. 1 shows a perspective view of a heating unit arranged in the space between the outer and inner wall plates of the vehicle.

Figure No. 2 shows an alternative construction of a heating unit arranged within the inner plate of the side wall.

In the construction shown in Figure No. 1, A marks the inner plate of the side wall of the vehicle and B the outer plate. An opening C is arranged through the inner plate covered with the usual grating. A heating member D, which may be electric or steam, is arranged immediately back of the opening C and provided with an immediate circulating and radiating space E—E—E. A plate G is arranged immediately back of this space, this plate being curved so that its front edges above and below the member D are flush with the face of the opening C and a second plate G′ of similar form is arranged back of the plate G forming a passage F opening above and below the member D through the opening C. A third plate G″ is arranged back of the plate G′ and is formed similarly to the plate G except that its ends are flanged so as to extend along the plate and a passage F′ is formed between the plate G′ and G″ similar to the passage F, this passage opening through the opening C. The plate G′ is preferably spaced somewhat within the plate B so that a dead air space formed between the wall plates B and A is afforded between the plate G″ and the outer plate B.

In the operation of this apparatus there is a local circulation immediately around the heating member D passing into the opening C, at the bottom, and out of the opening C at the top. This affects a heat transfer of comparatively high temperature to the plate G by reason of its close proximity to the heating member. This heating the air in the passage causes a circulation in the passage F, the velocity of this circulation depending on the intensity of the heat of the plate G and the comparative temperature assumed by the air in the passage. This

moving air, bringing in as it does the cooler air from the vehicle, dissipates the heat from the plate giving up some of the heat so taken up to the plate G′. This again heats the air in the passage F′ and causes circulation in this passage corresponding to the temperature which the air assumes. Obviously the temperature of the air in the passage F′ will be considerably less than that of the passage F and the number of passages is such as to very largely neutralize the heat losses through the outer plate on the outer passage, in the structure under consideration the plate G″ at the outside of the passage F′. In this way the total heat losses due to faulty insulation can be very much reduced, the radiating space and effectiveness of the heating member increased and such materials may be used in its construction as will readily endure the shocks and vibrations to which it is subjected in ordinary use.

In the construction shown in Figure No. 2 the heating unit is designed to be placed entirely within the side walls, that is, within the inner plate A. This is formed with a projecting plate A′ forming the top of the unit, the plate being stepped down forming the openings *a′* and *a*. The usual opening C′ is formed in the face of the unit and the heating element D is arranged immediately back of the opening C′ and is arranged within the space E′—E′—E′. A plate G^2 is arranged back of the heating member D and is curved forward to the opening C′. Immediately to the rear of the plate G^2 is a plate G^3 extending downwardly from the top A′ and in front of the inner plate A. A passage F^2 is arranged between the plates G^2 and G^3, this passage opening to the lower part of the space E′ and opening to the vehicle through the openings *a* in the plate A′. A similar passage F^3 is arranged between plates G^3 and A, opening to the lower part of space E′ and opening to the vehicle through the openings *a′* in plate A′. The general scheme of operation in this device is the same as that shown in Fig. 1.

What I claim as new is:—

1. In a heating apparatus for vehicles, the combination of a vehicle wall; a heating member adjacent to the wall; and means forming a plurality of air circulating and heat insulating passages between the member and the wall, said passages being open to the vehicle above and below the member.

2. In a heating apparatus for vehicles, the combination of a vehicle wall; a heating member adjacent to the wall; means forming a plurality of air circulating and heat insulating passages between the member and the wall, said passages being open to the vehicle above and below the member; and means forming a dead air space between the outer passage and the wall.

3. In a heating apparatus for vehicles, the combination of a vehicle wall; a heating unit next to the wall comprising a heating member; and a casing for the member open at the front and having a series of separate air circulating and heat insulating passages between the member and the wall open to the vehicle above and below the member.

4. In a heating apparatus for vehicles, the combination of a vehicle wall; a heating unit next to the wall comprising a heating member; and a casing for the member open at the front and having a series of separate air circulating and heat insulating passages between the member and the wall open to the vehicle above and below the member, the opening to the vehicle above the member being in front of the member.

5. In a heating apparatus for vehicles, the combination of a vehicle wall; a heating unit next to the wall comprising a heating member; and a casing for the member open at the front and having a series of separate air circulating and heat insulating passages between the member and the wall open to the vehicle above and below the member, the openings of the passages to the vehicle at both the top and bottom being in front of the member.

6. In a heating apparatus for vehicles, the combination of a vehicle wall having an outer and inner wall plate; a heating unit arranged in the space between the plates comprising a heating member communicating through an opening in the inner plate with the vehicle; and means forming a series of air circulating and heat insulating passages between the heating unit and the outer plate of the wall, said passages opening to the vehicle above and below the heating member.

7. In a heating apparatus for vehicles, the combination of a vehicle wall having an outer and inner wall plate; a heating unit arranged in the space between the plates comprising a heating member communicating through an opening in the inner plate with the vehicle; means forming a series of air circulating and heat insulating passages between the heating unit and the outer plate of the wall, said passages opening to the vehicle above and below the heating member; and means forming a dead air space between the outer wall plate and the outer passage.

In testimony whereof I have hereunto set my hand.

EUGENE P. CHASE.