E. E. GOLD.

HEATING SYSTEM.

APPLICATION FILED FEB. 21, 1911.

1,007,000. Patented Oct. 24, 1911.

Fig. 1.

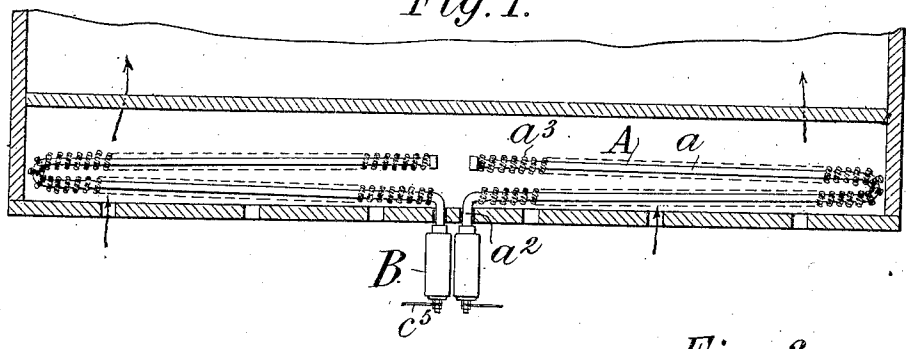


Fig. 2.

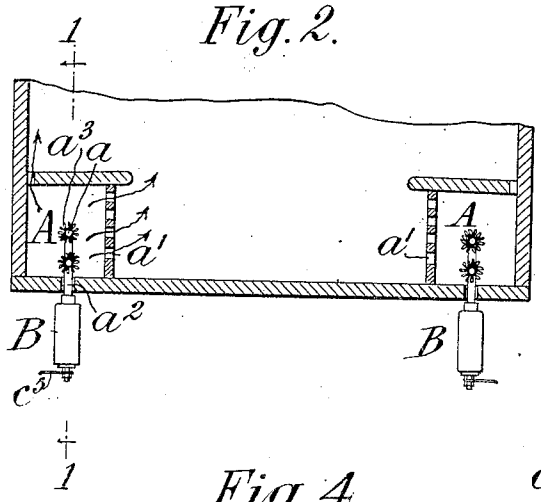


Fig. 3.

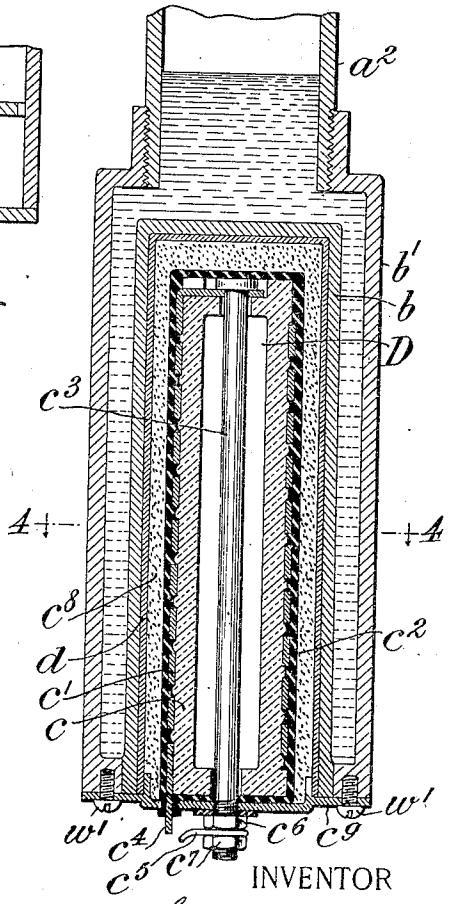
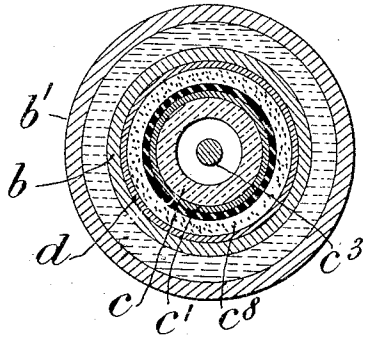


Fig. 4.



WITNESSES:

René Bruine

Fred White

INVENTOR

Edward E. Gold,

By Attorneys,

Fraser, Turner & Myers

UNITED STATES PATENT OFFICE.

EDWARD E. GOLD, OF NEW YORK, N. Y.

HEATING SYSTEM.

1,007,600. Specification of Letters Patent. **Patented Oct. 24, 1911.**

Original application filed December 23, 1910, Serial No. 598,887. Divided and this application filed February 21, 1911. Serial No. 610,056.

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Heating Systems, of which the following is a specification.

My invention relates to heating systems and will be found particularly desirable for use in heating surface cars, especially trolley cars, although it is not limited to such use and may be available for other uses, as for instance in heating garages and other places where it is advisable that the source of heat should be located outside of the apartment to be heated.

The invention consists in the provision of means whereby heat may be rapidly and economically generated from a heating pipe in which it is radiated for the heating of the apartment in which it is situated.

The particular invention forming the subject matter of this application is principally a division of a prior application filed by me December 23, 1910, Serial No. 598,887.

My invention may well be employed in connection with the heating system disclosed in my application for Patent No. 595,119, filed December 1, 1910, although it is not necessarily limited thereto.

My invention has for its object to provide an improved form of heater unit for use in connection with the form of heating pipe disclosed in my said application Serial No. 598,887. A desirable form in which my invention may be embodied is illustrated in the accompanying drawings wherein,—

Figure 1 illustrates a longitudinal section of a structure, as for instance a car body, to which is applied heating pipes constructed according to my invention. Fig. 2 is a cross section of the same. Fig. 3 is a vertical section of an extenson on said heating pipe, and of a heater pocket formed therein and of the heater unit within the said pocket. Fig. 4 is a cross section on the line 4—4 of Fig. 3.

In my said prior application for patent filed December 1, 1910 a heating pipe is employed which is only partially filled with vaporizable liquid and in which the balance of the pipe contains a vacuum, and the said pipe is sealed to prevent any breaking of the vacuum. This permits the quick vaporization of the liquid within the pipe upon heat being applied to the end of the pipe containing said liquid, and a rapid radiation of heat from the pipe is thereby obtained.

My present invention has for its object to induce a still more rapid vaporization of the liquid within the pipe, and a consequent more rapid radiation of the heat therefrom. In carrying my invention into effect I preferably employ a construction of heating pipe, such as illustrated in my application of which this is a division, which consists in forming at a point in said pipe, and preferably at the end of a vertical part thereof which constitutes the lowest point in the pipe, a double walled extension, the inner wall of which is open to the atmosphere at its outer end and closed at its inner end forming a pocket for the reception of a heater. The thickness of the sheet of liquid contained between the two walls of the pipe at said extension is very slight and may be as little as one-eighth of an inch. The inner wall of the pocket I preferably form of a thin tough metal which is a good heat conductor, and for which purpose I found copper to be admirable. Within the pocket thus formed I insert a heater unit, and the present invention is directed to the particular construction of such heating unit and the manner of assembling the same and holding it in place in the heating pipe. The said heater unit is preferably so constructed that there shall be no air insulation between the heater and the inner wall of the pocket. In other words, I prefer to have close contact between the said parts and if any spaces should exist they are preferably filled with some suitable heat conducting substance as sand.

It will be perceived that owing to the thin sheet of water, and the intimate connection between the heater and the same, that the fluid within the pipe may quickly be vaporized and the radiation of heat from the heating pipe will begin very shortly after the current is turned on at the electric heater.

In the particular embodiment of my invention illustrated in the accompanying drawings, the heating pipe A is illustrated as having upper portions *a* which are situated within the space to be heated, in this instance a trolley car, and may be located beneath the seat and behind the riser *a'* which is perforated to permit the passage of heat. This pipe as shown has a return bend

and a downward inclination and terminates in a part a^2 which is conveniently located and extends below the car floor. For the purpose of assisting the rapid radiation of heat from the heating pipe A, I may inclose the same in a coil of wire a^3, which encircles the periphery of the radiating portion of the pipe within the trolley car, as illustrated, and has the effect of increasing the rapidity of radiation from the pipe.

Upon the lower part a^2 is formed an extension B which is illustrated as slightly enlarged and has secured to its outer end a tubular socket b which is suitably attached to the outer end of the extension B, as for instance by brazing, and is closed on its inner end forming a tubular socket which is adapted to receive the heater unit. The said extension B is suitably secured to the portion a^2 of the heating pipe A, as for instance by being screw-threaded thereon, as illustrated, although other form of connection may be employed if desired.

The space between the outer wall which I shall designate b' of the said extension B and the inner wall b is filled with the liquid contained in the said lower part of the pipe, and the distance between the said outer and inner pipes is very slight and may be as little as one-eighth of an inch. An electric heater is placed within the pocket produced by the inner socket b and heats the liquid between the walls b b'. The particular heater with which the present invention is concerned is designated as a whole by the letter D. This comprises an outer metal jacket d in which the heater proper is inserted and wherein it is closely packed. The said metal jacket is removable from the pocket for the purpose of insertion of the heater or for repairing the same, and fits closely within the inner wall b. This jacket d may be of some good heat conducting metal as for instance copper. Within this jacket is placed the heater constructed substantially as illustrated in Fig. 3 of a porcelain core c upon which is wound a heating wire c' which is suitably insulated, as for instance by being covered with a coating of enamel c^2 which covers the said wires and insulates them one from another to prevent short circuit. The heater thus constructed is placed within the metal jacket d and packed therein with a suitable heat-conducting substance c^8 for which sand is well adapted. A cover c^9 may then be applied to the said heater and held in place by binding screws c^6 c^7, and the said heater may be inserted within the pocket formed by the inner wall b, and screws w' then applied to hold the heater in place. The circuit is completed through the metal rod c^3 and wire c^5 and leading-in wire c^4. The particular manner in which the heater unit is held in place, which is illustrated, is only one of many ways by which the heater could be secured to the heating pipe.

The vaporizable fluid employed in said pipes, which may be water, should be supplied in small amounts. It will probably be found that about a pint of water will be sufficient, depending somewhat upon the diameter of the heating pipe. A pipe having 1¼ inches diameter throughout its radiating portion and 2 inches diameter in the extension, I have found to be of desirable size. It will be apparent that the heater may be assembled within the metal jacket and tightly packed therein and the cover c^9 applied thereto and suitably held in place by the binding screws and that the sembled structure may then easily and conveniently be inserted within the pocket in the extension B and held therein by any suitable means. It will also be perceived that the resulting structure is one capable of inexpensive construction, and it is remarkably efficient in operation. It is simple and easy to repair and if necessary a heater may be removed for repair and a fresh one inserted in a short time and thereby the utility of the rolling stock of railroads is not impaired by reason of any delay in repairing the heating apparatus.

It is not to be inferred from the particularity with which I have described the details of construction of the said heater that my invention is necessarily limited to all of these details, as equivalent devices may be substituted and changes made therein within the limits of the appended claims.

What I claim is:—

1. In a heating system, a heating pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, an electric heater therein, and a filling of heat conducting material between said jacket and said electric heater, and means for retaining said heater unit in place.

2. In a heating system, a heating pipe partly filled with vaporizable liquid and having a substantial vacuum in the balance of the pipe, said pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, an electric heater therein and a filling of heat conducting material between said jacket and said electric heater, and means for retaining said heater unit in place.

3. In a heating system, a heating pipe having a vertical part, projecting downwardly and partly filled with a vaporizable liquid, and having a substantial vacuum in the balance of the pipe, said extension provided with double walls, the inner wall forming a pocket for the reception of a heater, and a heater within said pocket comprising a closely fitting metal jacket, an

insulating core, electrical heating wires thereon, an insulator for said wires and a filling of heat conducting material between said wires and said jacket, and means for supporting said heater in said pocket.

4. In a heating system, a heating pipe having a vertical part, projecting downwardly and partly filled with a vaporizable liquid, and having a substantial vacuum in the balance of the pipe, said extension provided with double walls, the inner wall forming a pocket for the reception of a heater, and a heater within said pocket comprising a closely fitting metal jacket, an insulating core, electrical heating wires thereon, an insulator for said wires and a filling of heat conducting material between said wires and said jacket, and means for supporting said heater in said pocket comprising an extension on the inner wall and securing devices attached to said extension and extending beneath the heater.

5. In a heating system, a heating pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, and an electric heater therein, said heating pipe, metal jacket and electric heater being in heat-conducting relation to each other, whereby the heat of said heater is readily conducted to said heating pipe.

6. In a heating system, a heating pipe partly filled with a vaporizable fluid and having a substantial vacuum in the balance and formed with a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, and an electric heater therein, said heating pipe, metal jacket and electric heater being in heat conducting relation to each other, whereby the heat of said heater is readily conducted to said heating pipe.

7. In a heating system, a heating pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket fitting snugly in said pocket, and an electric heater therein, and a filling of heat conducting material between said heater and said jacket, whereby the heat of said heater is readily conducted to said heating pipe.

8. In a heating system, a heating pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, and an electric heater therein, comprising a core, a heating wire wound about said core and having its coils insulated from each other, connections from said wire to a source of electricity, said heating pipe, metal jacket and electric heater being in heat conducting relation to each other, whereby the heat of said heater is readily conducted to said heating pipe.

9. In a heating system, a heating pipe having a double-walled extension removably attached to said pipe and forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, and an electric heater therein, said heating pipe, metal jacket and electric heater being in heat conducting relation to each other, whereby the heat of said heater is readily conducted to said heating pipe.

10. In a heating system, a heating pipe having a double-walled extension forming a heater pocket, a heater unit adapted to be inserted in said pocket comprising a metal jacket, and an electric heater therein, said heating pipe, metal jacket and electric heater being in heat conducting relation to each other, whereby the heat of said heater is readily conducted to said heating pipe, and a cap attached to said extension and underlying said pocket and holding said heater in place.

11. In a heating system, a heating pipe having a pocket formed therein, a heating unit adapted to be inserted in said pocket and to be removed therefrom, comprising a jacket having its inner end closed, a heater within said jacket and a heat conducting filling between said heater and jacket of loose material, and means for closing the outer end of said jacket and retaining said filling.

12. In a heating system, a heating pipe having a pocket formed therein, a heating unit adapted to be inserted in said pocket and to be removed therefrom, comprising a jacket having its inner end closed, a heater within said jacket, a filling of loose heat conducting material between said heater and said jacket, and means for retaining said heating unit in place in said pocket, which close the outer end of said jacket.

13. In a heating system, a heating pipe partly filled with a vaporizable fluid and having a substantial vacuum in the balance and having a fluid chamber for the collection of water of condensation, having a pocket formed therein, a heating unit adapted to be inserted in said pocket and to be removed therefrom comprising a jacket, and a heater within said jacket and removable therefrom.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:
HENRY M. TURK,
THOMAS F. WALLACE.