E. E. GOLD.

HEATING SYSTEM.

APPLICATION FILED DEC. 23, 1910.

1,043,922. **Patented Nov. 12, 1912.**

Fig. 1.

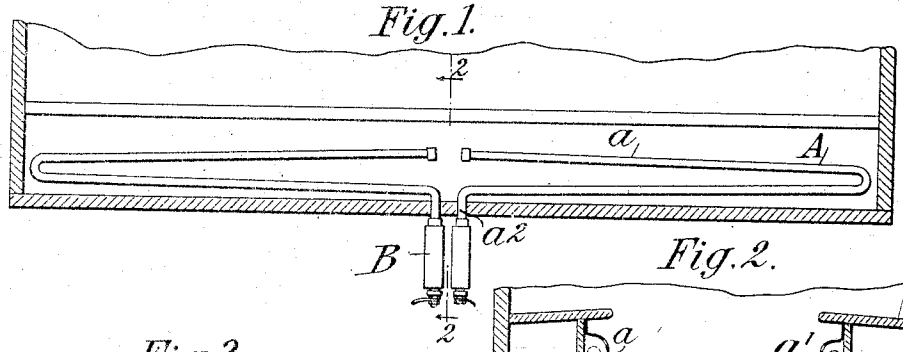


Fig. 2.

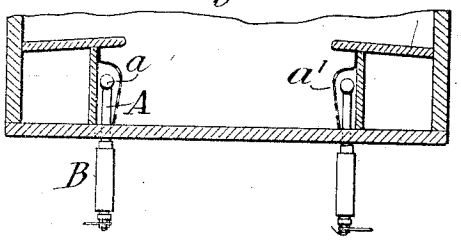
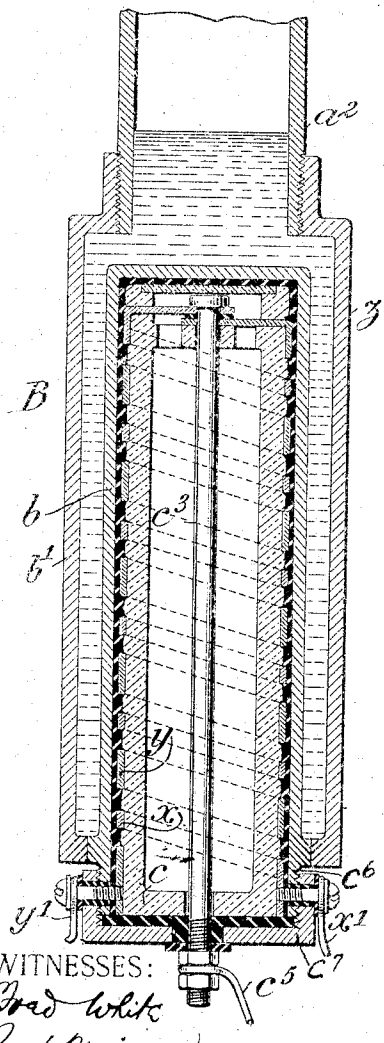


Fig. 3.



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UNITED STATES PATENT OFFICE.

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HEATING SYSTEM.

1,043,922. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed December 23, 1910. Serial No. 598,887.

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.

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

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

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, having applied thereto heating pipes constructed according to my invention; Fig. 2 is a cross-section of the same; Fig. 3 is a vertical section of an extension on the said heating pipe, and of a heater pocket formed therein and the heater within the said pocket.

In the device illustrated in my said prior application for patent, 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 heat therefrom.

To this end my invention consists in forming at a point in the 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 on 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 the 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 have found copper to be admirable. Within the pocket thus formed I insert a heater unit, and I preferably so construct the said device as there shall be no air insulation between the heating element 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. For heating purposes I have found an electric heater to be desirable and useful, and for the purpose of easily obtaining different degrees of heat this heater may have two or more circuits composed of wires of different heating capacities, one or more of which may be in circuit at the same time, whereby varying degrees of heat may be produced as desired.

It will be perceived that owing to the thin sheet of water and to the intimate contact from the heater to 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 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 are located beneath the seat and in front of the riser and behind the register a^1. This pipe as shown has a return bend and a downward inclination, and terminates in a part a^2 which is conveniently located below the car floor.

Upon this lower part is formed an extension B, which may well be slightly enlarged, and has secured to its outer end an inner tubular socket b which is open on its outer end and closed on its inner end. The space between the outer wall, which I shall designate b^1, 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 space between the said pipes is very slight; it may be as little as one-eighth of an inch. A heater is placed within the heating pocket produced by the inner socket b and heats the liquid between the walls of the pipe. I have found that an electric heater is well adapted to this purpose, and have illustrated such heater in the several figures of the drawings. The radiating pipes are made short (two in the length of a trolley car, as shown) and of such a downward pitch that the water of condensation runs quickly down to the lower end while it is still hot and requires only a short time and a small quantity of heat to re-vaporize it, especially in the partial vacuum which exists.

No special construction of electric heater is essential to my invention. Any suitable means may be provided for securing the heater within the said pocket. As illustrated in Fig. 3, the inner socket b, which is here made of copper brazed to the wall b^1 at the bottom, is provided with a tubular prolongation or extension c^6 upon which is secured means extending below the heater for holding the same in place. As illustrated such means is a cap c^7 which is threaded upon the said extension c^6. A porcelain core c is provided, and upon the periphery of this core there are spirally wound conducting mediums having different heating capacities which as shown consist of a small flat wire x connected to a leading in wire x^1, and a larger wire y of greater heating a capacity connected to a leading in wire y^1. Switches, which are not illustrated, are employed to connect one or the other or both of these wires in circuit. Both circuits are completed through rod c^3 and return wire c^5. It will be perceived therefore that three degrees of heat may be obtained depending on whether wire x is employed or wire y, or both of the said wires. The vaporizable fluid employed in the said pipes, which may well be water, should be supplied in small amount. It will probably be found that about a pint of water will be sufficient. This will depend 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 a desirable size.

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

I claim as my invention:—

1. The combination with a car of a steam heating system therefor comprising a radiating pipe having closed ends and having a continual inclination from one end to the other so as to form a closed non-circulating chamber for the steam, said pipe having a partial vacuum therein and having a small quantity of water in its lower end, the lower end of said pipe forming a pocket which is surrounded by a thin annular body of the water, and an electric heater within said pocket making close contact with the wall thereof so as to quickly vaporize the surrounding thin body of water, said radiating pipe being so short and being inclined at such a pitch as to return the water of condensation to its lower end while such water is still hot and requires only a short time and a small quantity of heat to reconvert it into steam.

2. The combination with a car of a steam heating system therefor comprising a plurality of radiating pipes A each extending longitudinally and covering a part of the length of the car, each having an upper portion a and a return bend and having a continual inclination from one end to the other so as to form a closed non-circulating chamber for the steam, each of said pipes having a partial vacuum therein and having a small quantity of water in its lower end, the lower end of each pipe forming a pocket which is surrounded by a thin annular body of the water, and an electric heater in said pocket making close contact with the wall thereof so as to quickly vaporize the surrounding thin body of water, each of said radiating pipes being so short and being inclined at such a pitch as to return the water of condensation to its lower end while such water is still hot and requires only a short time and a small quantity of heat to reconvert it into steam.

3. The combination with a car of a steam heating system therefor comprising a radiating pipe having closed ends and having a continual inclination from one end to the other so as to form a closed non-circulating chamber for the steam, said pipe having a partial vacuum therein and having a small quantity of water in its lower end, the lower end of said pipe forming a pocket which is surrounded by a thin annular body of the water, and an electric heater within said pocket making close contact with the wall thereof so as to quickly vaporize the surrounding thin body of water, said radiating pipe being so short and being inclined at such a pitch as to return the water of condensation to its lower end while such water

is still hot and requires only a short time and a small quantity of heat to reconvert it into steam, the inner wall of said pocket being separately formed and fastened to the outer wall thereof with said annular space between, and having an extension to which said heater is attached.

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

EDWARD E. GOLD.

Witnesses:
HENRY M. TURK,
FRED WHITE.