

(No Model.)

E. E. GOLD.  
HEATING APPARATUS.

No. 388,772.

Patented Aug. 28, 1888.

Fig. 1.

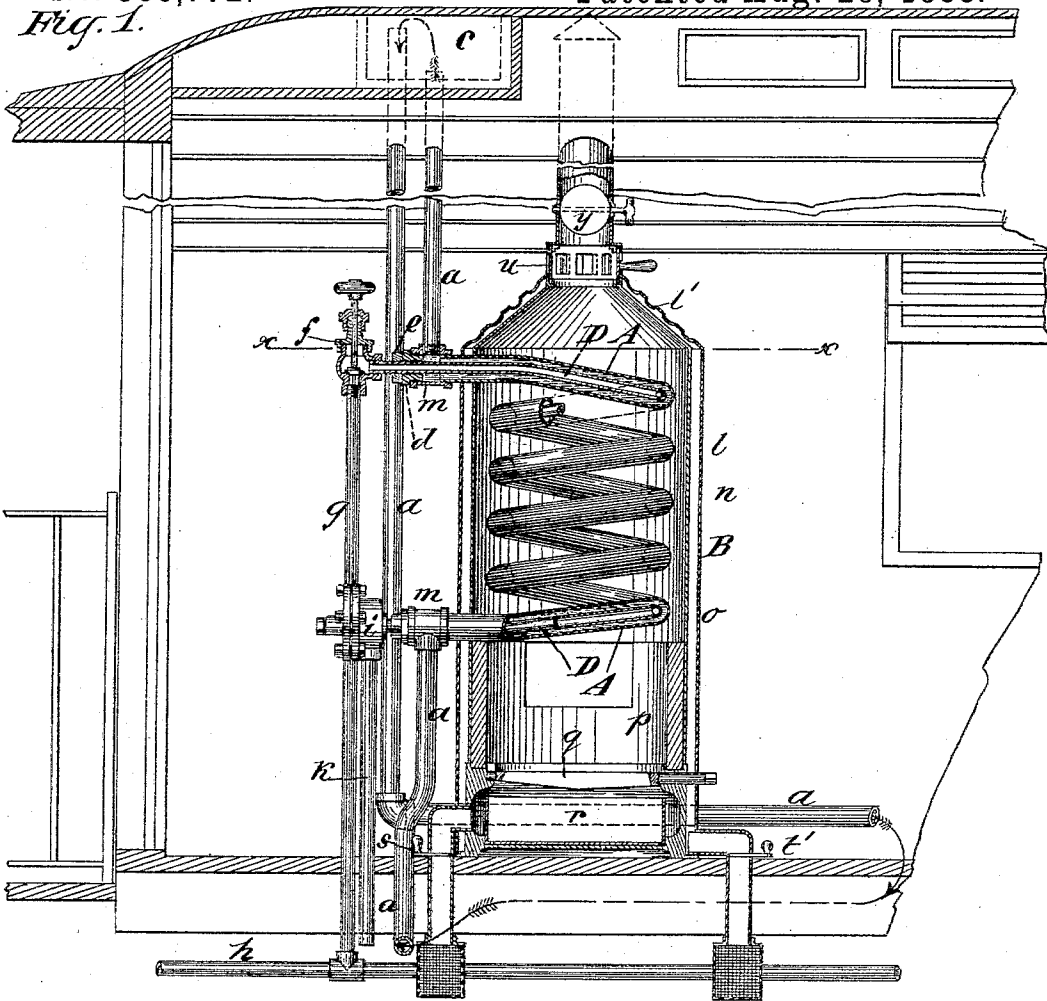
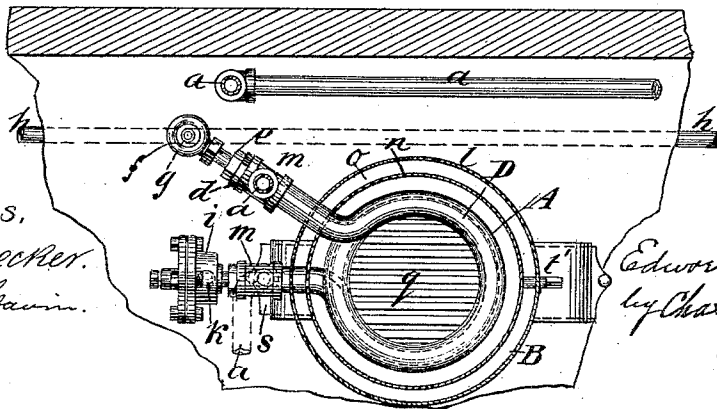


Fig. 2.



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# UNITED STATES PATENT OFFICE.

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## HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 388,772, dated August 28, 1888.

Application filed August 25, 1887. Serial No. 247,795. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD E. GOLD, of New York city, New York, have invented certain new and useful Improvements in Heating Apparatus, of which the following is a specification.

My invention relates to combined steam and hot-water heating apparatus, more particularly adapted for heating railroad-cars, but also applicable for heating buildings and for other purposes. It relates to that class of apparatus wherein a water-circuit is supplied with both a steam-radiator and a heating-stove, whereby the water may be heated and circulated by the application of steam alone or fire alone, or both together, as in my pending applications, Nos. 230,307 and 238,590. My present improvements lie chiefly in the special construction of the steam-heater and stove-heater and the water-circuit in relation thereto; and it consists mainly in having a tubular coil as part of the water-circuit and a tubular coil as part of the steam-heater, one coil being inclosed within the other, whereby the water in the water-coil is rapidly heated and circulated by the direct action of the steam in the concentric steam-coil. This compound coil is placed within a stove, so that when steam is not supplied the coil may be heated by the direct action of the fire. This stove is provided with air-inlets from the external air and air-outlets within the car or apartment heated, so that when the stove is not fired, but the steam-coil is in operation, the stove may act as an air-heater and ventilator by allowing fresh air to be drawn in over the compound coil and discharging it heated into the apartment.

My invention therefore consists mainly in the features above outlined, as hereinafter fully set forth and claimed.

In the drawings annexed, Figure 1 is a vertical section of my improved heating apparatus, shown fitted in the corner of a railway-car. Fig. 2 is a sectional plan on *x x*.

In the drawings, *a* indicates the pipes of a hot-water circuit or circulating system, the terminals of which connect to a water-heating coil, A, which is placed within the chamber of a heating-stove, B. The ascending branch of the water-circuit opens into an elevated expansion-box, *c*, as usual in car-heaters of this

class, while the descending branch continues from the top of the box to the floor of the car, and passing around the same crosses, in the usual manner, under the floor at one end of the car and connects to the lower terminal of the heating-coil A, as shown in Fig. 1. The circuit is not shown continuous in the drawings, as the construction of such circuits is well understood, the pipe *a* being broken off near the stove; but the broken ends are of course presumed to be connected through a continuation, forming a continuous circuit, as will be readily comprehended.

In heating railway-cars, where the circuit lies chiefly below the heating-coil and stove, the elevated expansion-box *c* is of course necessary to insure the circulation of the water; but where the water-circuit is carried above the heating-coil this expansion-box will not be necessary.

Now, referring to Fig. 1, it will be noted that within the water-coil A, I place concentrically a second coil, D, of smaller pipe, which serves as a steam-heating coil, the ends of which steam-coil project from the T's *m m*, which connect the ends of the water-coil with the terminals of the water-circuit pipe *a*, as best shown in Fig. 1. The projecting ends of the small pipe coil D are threaded with a running thread, and are secured in the T's by bushings *d* and lock-nuts *e*, thus enabling the ends of the steam-coil to issue water-tight from the water-coil without having the bore of either coil communicating, while the water of the water-circuit fills the space between the two coils, but cannot enter the steam-coil, as will be understood from Fig. 1. The outer coil, A, I prefer to make of pipe of two inches diameter, while the inner pipe is three-fourths of an inch in diameter, thus providing ample water-space between the two for free circulation of water. The upper end of the steam-coil connects to an angle-valve, *f*, on the top of a steam branch pipe, *g*, which extends from a main steam-supply pipe, *h*, which is supplied from the engine or other source of steam or heating fluid, and preferably extends longitudinally under the car, as shown. The lower end of the steam-coil connects to a small trap, *i*, preferably of the thermostatic kind shown in my patent, No. 350,880, dated October 12, 1886,

and from this trap a drip-pipe, *k*, extends through the floor of the car to discharge the condensation on the track. It will therefore be now readily understood that when steam is admitted to the coil by opening the valve *f* it will be rapidly condensed in the water-surrounded coil, and a great quantity of heat thus transmitted to the water between the two coils, thereby causing the water in the water-circuit to become rapidly heated and circulated. It will be readily appreciated that by this means the heating and circulating action will be most certain and efficient, as the heat of the steam is applied to the core of the water-coil along its whole length, which is a new and important feature in combined steam and hot-water apparatus, and its construction is simple and inexpensive.

It will be understood that according to my invention it is immaterial whether the steam-coil is within the water-coil, as shown, or the water-coil within the steam-coil, provided one is inclosed within the other; but it is considered much more efficient and convenient to have the steam-coil within the water-coil, as illustrated. The coils may be made of iron pipe, or of brass or copper pipe, preferably, and both pipes are coiled together after being cut to the right length, threaded, and slipped one within the other.

It will be seen on reference to Fig. 1 that the stove is formed with two shells or casings, *l n*, with an air space or jacket, *o*, between the two, and that the interior of the stove below the coil is provided with a fire-pot, *p*, a grate, *q*, and an ash-pit, *r*, in substantially the usual manner. Doors are provided for the fire-box and ash-pit in the ordinary way. Now, while the cars are connected to the locomotive, or while a sufficient supply of steam is furnished to the main pipe *h*, no fire will be lighted in the stove, and the latter will be dormant, or will serve merely as a casing for the compound heating-coils *D A*. Under these circumstances, however, the stove may serve as an indirect radiator or ventilator to heat an influx of fresh air and deliver it into the car. For this purpose I arrange a fresh-air inlet, *s*, to discharge into the interior of the stove at the ash-pit or other point, while a register, *u*, at the top of the casing or base of the stove-pipe below the damper *y* will allow the air to flow from the casing into the car. The inlet *s* is provided with a valve or slide, *s'*, within the car, whereby it may be opened or closed, according to circumstances, while the external opening of the inlet below the car-floor is protected by a screen, as shown in Fig. 1, to exclude dust. It will therefore be understood that when the steam-coil is in operation and the damper *y* closed, while the slide *s'* and register *u* are opened, fresh air will enter the stove-casing, flow over the compound coil, and thus become heated, and issue from the register *u* into the car, thus supplying fresh warm air thereto, in addition to the heat radiated from the hot-

water pipes, and thereby serving to both warm and ventilate the car in an efficient and agreeable manner. The jacket *o* between the double casing *l n* is also preferably provided with a fresh-air inlet, *t*, provided with a valve and screen like that already described, and the outer casing is perforated at the top, as seen at *v* in Fig. 1, so that fresh air may also be admitted between the casings and thence discharged warm into the car at the top, so that by regulating the air-slides *s' t'* and the register *u* any desired degree of ventilation may be obtained in a simple manner.

When a supply of steam cannot be obtained—such as when the car is detached or side-tracked—a fire may then be lighted in the stove *B*, which will of course heat and circulate the water in the coil *A* and pipes *a*, and thus diffuse the desired heat in the car. In this case the function of the steam-coil *D* will of course be dormant; but it will in no way interfere with the action of the stove or the circulation of the water.

When the stove is in action, the register *u* and the slide *s'* will of course be closed and the damper *y* opened to the desired extent. The slide *t'* of the inlet *t* may, however, be opened when desired to admit fresh air between the casings, so as to serve the double purpose of preventing too much heat being radiated from the stove in its direct vicinity, and to admit some warm fresh air into the car, so that whether the steam-coil or the fire is in operation a means is always provided for admitting fresh air and warming it before discharging it into the car, which means of ventilation and heat-diffusion may be used or not, according to circumstances.

Instead of water, any other suitable liquid may be used in the pipes of the liquid-circuit, as will be readily understood; but salted water is preferred.

In my present application for patent I make no claim to the features of invention herein shown, and which are claimed in my said applications Nos. 230,307 and 238,590, which applications are involved in sundry interferences. I herein specifically disclaim the subject-matters in issue in said interferences, namely: First, the combination, with a car, of a system of circulating-pipes within said car, and two heaters, both in operative contact with said circulating system, or with branches thereof, and adapted to be operated simultaneously or separately for imparting heat thereto; second, in a car-heating system, the combination, with a system of water-circulating pipes within the car, of a suitable radiator in contact with said circulating system, or a branch thereof, mechanism for supplying said radiator with steam as a primary means of heating said circulating system, and a secondary heater also in operative contact with said circulating system and adapted to heat the same; third, in a car-heating system, the combination, with a system of water-circulating pipes within the car, of a

main steam-pipe attached to the car and means  
for connecting it with a suitable generator, a  
steam-radiator in operative contact with said  
circulating system, or a branch thereof, and a  
5 branch pipe connecting said main steam-pipe  
with said radiator and adapted to supply the  
same with steam.

Such novel features as I have shown, but not  
claimed herein, I reserve the right to claim in  
10 a subsequent application.

What I claim as my invention is—

1. In a heating apparatus, the combination,  
with a water-coil and a steam-coil arranged  
one within the other, of a stove within which  
15 the double coil is placed, a source of steam  
connecting to the steam-coil, and a water-cir-  
culating system connected to the water-coil,  
substantially as set forth.

2. The combination, with the coil A and

circuit-pipes *a*, connecting to the terminals 20  
thereof, of the inner heating-coil, D, inclosed  
in coil A, with its ends projecting from the  
ends thereof, a source of steam connected to  
one end of said steam-coil, and a trap connected  
to the opposite end of the same, substantially 25  
as shown and described.

3. The compound coils D A, in combination  
with a stove, B, inclosing and arranged to heat  
said coils, water-circuit pipes *a*, connecting to  
coil A, and a steam-supply pipe, *g*, connecting 30  
to one end of the coil D, with a valve, *f*, in  
the connection, and a trap, *i*, on the opposite  
end of the coil, substantially as herein shown  
and described.

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Witnesses:

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