

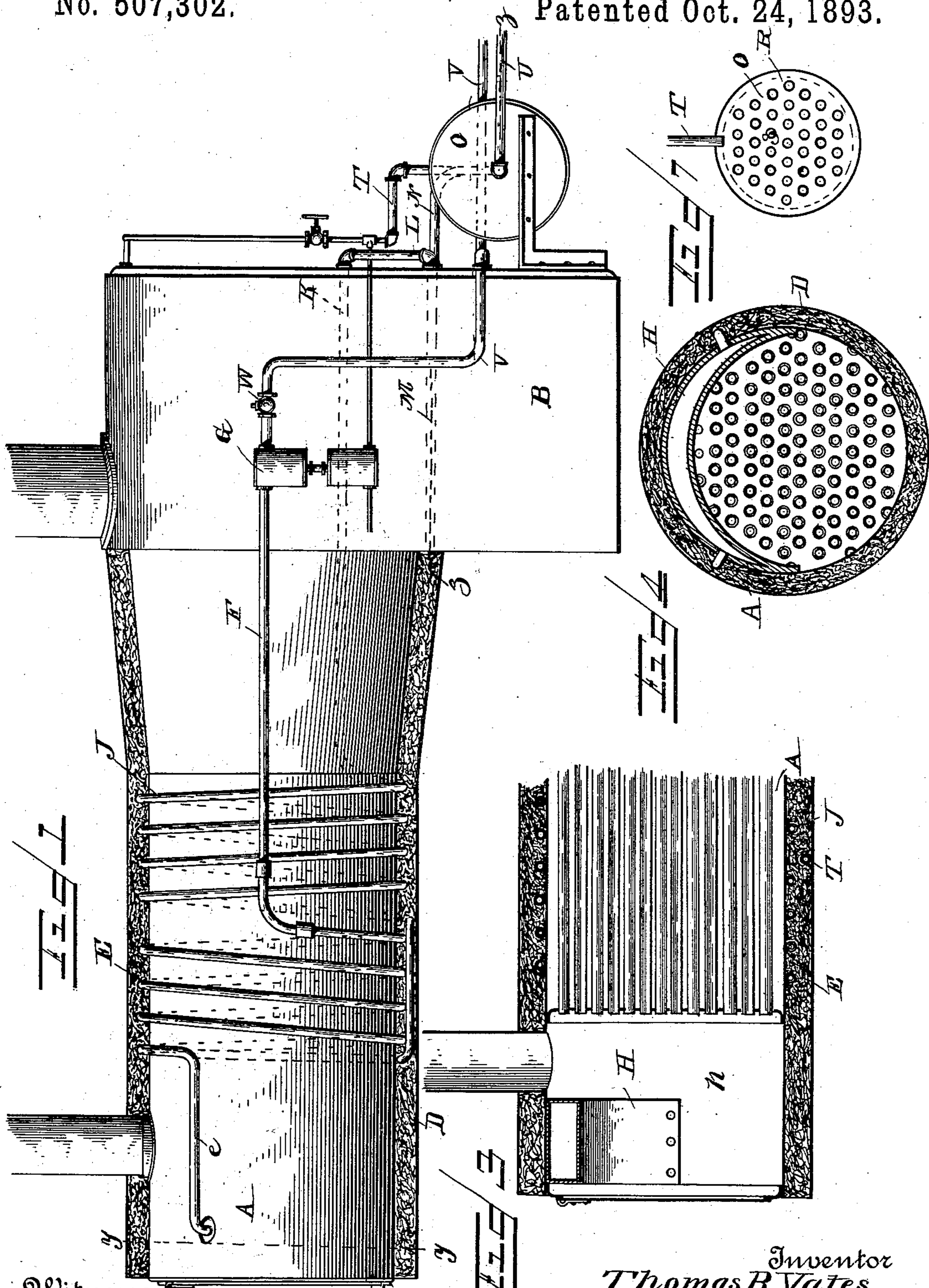
(No Model.)

2 Sheets—Sheet 1.

T. R. YATES.  
CAR HEATING APPARATUS.

No. 507,302.

Patented Oct. 24, 1893.



Witnesses  
W. C. Schneider.  
D. P. Wochaupt.

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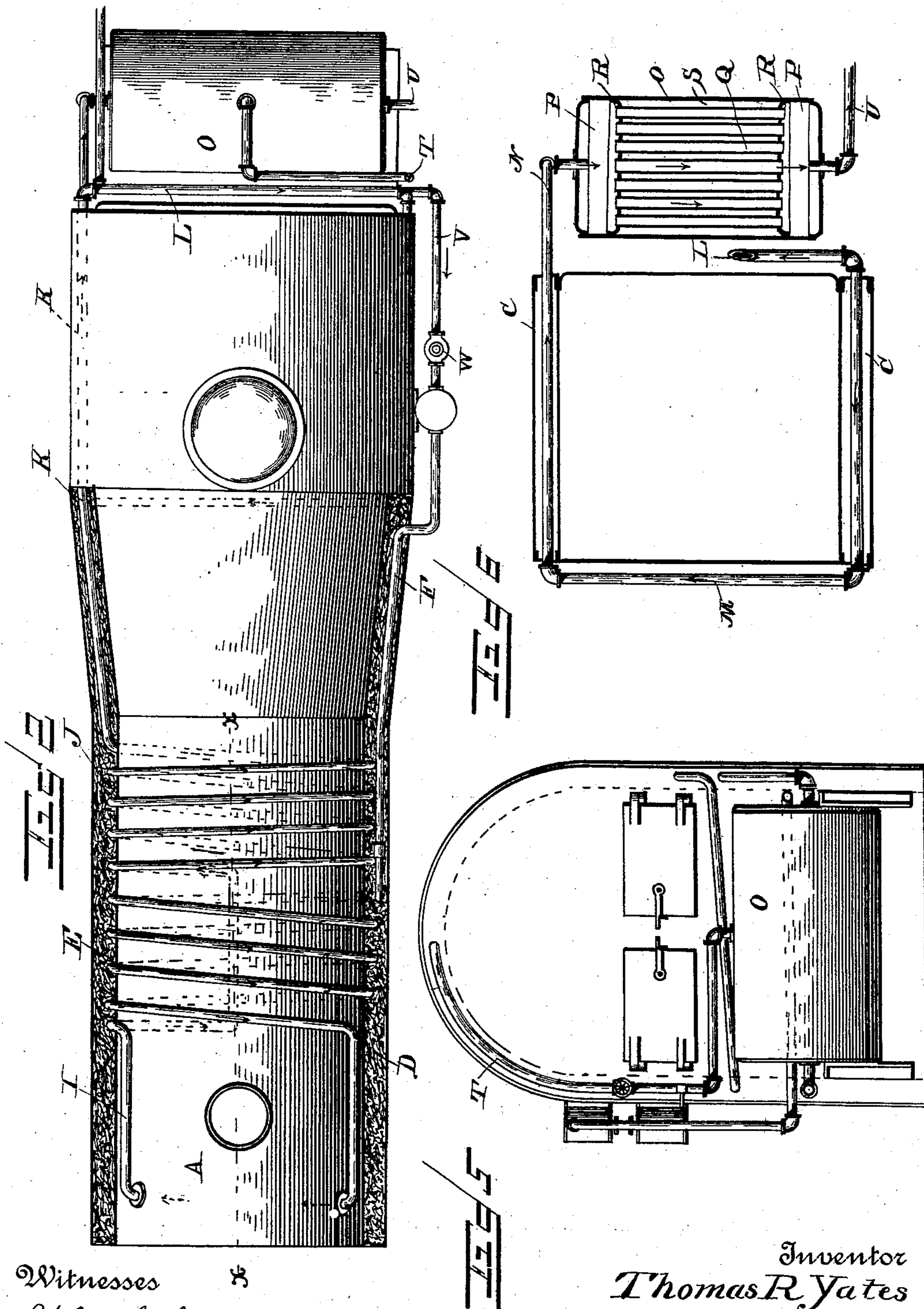
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# UNITED STATES PATENT OFFICE.

THOMAS R. YATES, OF WASHINGTON, PENNSYLVANIA.

## CAR-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 507,302, dated October 24, 1893.

Application filed May 2, 1893. Serial No. 472,674. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS R. YATES, a citizen of the United States, residing at Washington, in the county of Washington and State of Pennsylvania, have invented a new and useful Car-Heating Apparatus, of which the following is a specification.

This invention relates to car heating apparatus; and it has for its object to provide certain improvements in apparatus used for heating air for the purpose of supplying the radiators of railway cars, or for other heating purposes.

To this end the main and primary object of the said invention is to provide an improved car heating apparatus which shall fully utilize the heat usually lost by radiation from the shell of locomotive boilers, the heat from the smoke and other products of combustion escaping from the boiler, as well as the heat from the water itself, in connection with auxiliary or supplemental heating devices whereby the air is heated to a very high degree and put in rapid circulation so as to be particularly available for use in heating cars.

With these and other objects in view which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a side elevation of a locomotive boiler, having a car-heating apparatus constructed in accordance with this invention. Fig. 2 is a top plan view of the same. Fig. 3 is a detail vertical sectional view on the line  $x-x$  of Fig. 2. Fig. 4 is a transverse sectional view on the line  $y-y$  of Fig. 1. Fig. 5 is an end view of a locomotive boiler and a portion of the heating apparatus. Fig. 6 is a horizontal sectional view on the line  $z-z$  of Fig. 1. Fig. 7 is a detail transverse sectional view of the auxiliary steam heater box.

Referring to the accompanying drawings, A represents a locomotive boiler having the usual end fire box B, at each side of which is arranged the opposite side water legs or spaces C, which communicate with the inte-

rior water space of the boiler in the ordinary manner. The front portion of the outer shell of the boiler A, beyond the fire box end B, thereof, is entirely incased in a close fitting covering D, of suitable non-conducting material, which is intended to effectually prevent any heat from being lost by radiation, and to hold such heat onto the heating coils which are wrapped exteriorly about the body of the boiler and in direct contact therewith as will now be referred to. The heating coil E, consists of a suitable number of convolutions of piping, and is wrapped close around and in contact with the body of the boiler A, near to the smoke stack end thereof, so as to receive the heat from the body of the boiler and thereby heat up the air contained therein. The heating coil E, may be properly termed the supply heating coil, and has connected with one terminal thereof the side air supply pipe F, which is disposed longitudinally in one side portion of the covering D, and is connected with an ordinary air pump G, arranged at one side of the boiler and operated in the ordinary manner by steam, so as to force a supply of air through the supply coil E, from which the air passes through the coil connection  $e$ , into the air tight receiver box H. The connection  $e$ , pierces the locomotive boiler at one side and the front thereof and is suitably connected with one side of the box H, which is arranged inside of the smoke box H, at one end of the boiler.

The air tight receiver box H, is constructed in any suitable form to receive the heat contained within the smoke box of the boiler, but is preferably formed in a crescent-shape as clearly shown in Fig. 4 of the drawings, so as to be conveniently attached to the top of the smoke box and thereby receive the full effect of the heat therein. A second coil connection I, is connected to one side of the receiver box H, directly opposite the connection  $e$ , therewith, and passing through the non-conducting covering D, to a point in rear of the supply heating coil E, leads into a second circulating or return heating coil J. The circulating heating coil J, is preferably formed of a suitable number of convolutions of piping somewhat larger in diameter than the piping

of the coil E, in order to provide a greater heating area for the air circulating there-through. The coil J, is also wrapped close around the cylindrical body of the boiler to receive the external heat thereof, and is provided with a circulating pipe K, leading from the rear terminal thereof through one side portion of the covering D, and into and through one of the side water legs C, of the fire box end of the boiler.

The coil circulating pipe K, which passes entirely through one of the water legs C, is connected at its rear extremity to the transverse connecting pipe L, which is disposed across the rear end of the boiler and is connected with the water leg coil M, which coil completely embraces the fire box of the boiler and has its opposite side portions pass through the opposite water legs, so that the air circulating therethrough will receive additional heat from the hot water contained within said water legs.

The water leg coil M has an extended connection N, outside of the fire box of the boiler which is connected to one end of the cylindrical auxiliary steam heater box, O, suitably supported in position in rear of the locomotive boiler. The cylindrical heater box O, is provided with the opposite end air spaces P, which are connected by a series of circulating tubes Q, the ends of which are fitted into the tube sheets R, firmly secured within the box near the opposite heads thereof to form the end air spaces P, and an intermediate steam heating space S, through which the tubes Q, pass, and which is supplied with live steam directly from the boiler through the live steam supply pipe T. A circulating pipe U, leads from one end of the box O, to the radiators of the cars, and the return circulation is kept up through the return pipe V, leading from the radiators of the car and connected with the air pump G, said return pipe being provided if necessary with a suitable valve W, to supply air to the pump when the vacuum is too great and is not relieved by the circulation.

From the foregoing it is thought that the construction, operation and many advantages of the herein-described heating apparatus will be readily apparent to those skilled in the art. Following the course of the air from the air pump G, the same receives the first heat from the supply heating coil embracing the boiler. Passing into the receiver box within the smoke box and thence through the coil J, the air is additionally heated so that when it passes through the water legs of the fire-box it will not lower the temperature of the water in the boiler at that point, but will receive heat from the water, and finally passing through the steam heater box it becomes very highly heated and available for quickly heating the car. It will be apparent that by tapping the radiators in the cars,

and allowing the hot air to discharge directly thereinto, cold cars can be heated up in a very short period of time.

Changes in the form, proportion and the minor details of construction, as embraced within the scope of the appended claims, may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a car heating apparatus, the boiler, a heating coil wrapped exteriorly about the body of the boiler in direct contact with the outer shell thereof, a non-conducting covering closely packed on the outer shell of the boiler and about said heating coil, and circulating pipes connected with said coil, substantially as set forth.

2. In a car heating apparatus, the locomotive boiler having a closely fitting exterior non-conducting covering on its outer shell, a receiver box arranged inside of the smoke box of said boiler, a heating coil wrapped continuously around and in direct contact with the outer shell of the boiler inclosed by its covering said coil leading at one end into said receiver box, and circulating pipes connected with the other end of said coil and said receiver box, substantially as set forth.

3. In a car heating apparatus, the locomotive boiler having an exterior non-conducting covering on its outer shell, a supply heating coil exteriorly embracing the boiler in contact with its outer shell, an adjacent circulating heating coil also exteriorly embracing the boiler, a crescent-shape receiver box adapted to be arranged inside of the smoke box of the boiler, connections between said heating coils and said receiver box, and circulating pipes connected separately with said coils, substantially as set forth.

4. In a car heating apparatus, the locomotive boiler, heating coils exteriorly embracing the boiler, a separate coil connected with said coils around the boiler and adapted to have separate portions thereof pass through water spaces of the boiler, and circulating pipes connected with the water space coil and the heating coils, substantially as set forth.

5. In a car heating apparatus, the combination with a locomotive boiler having a water leg fire box; of the exterior heating coils surrounding the boiler, a water leg coil connected with said heating coils and embracing the fire-box to dispose its opposite side portions inside of its water legs, and circulating pipes connected with said water leg coil and said heating coil, substantially as set forth.

6. In a car heating apparatus, the combination with the locomotive boiler having an exterior non-conducting covering and a water leg fire box, of the exterior heating coils

embracing the body of the boiler, a water leg  
coil connected with the heating coil and pass-  
ing through the water legs of the boiler, an  
auxiliary heater box connected with said wa-  
5 ter leg coil, and circulating pipes connected  
with said auxiliary heater box and the heat-  
ing coils, substantially as set forth.

In testimony that I claim the foregoing as  
my own I have hereto affixed my signature in  
the presence of two witnesses.

THOMAS R. YATES.

Witnesses:

W. E. WOLFE,

HUGH A. ROGERS.