

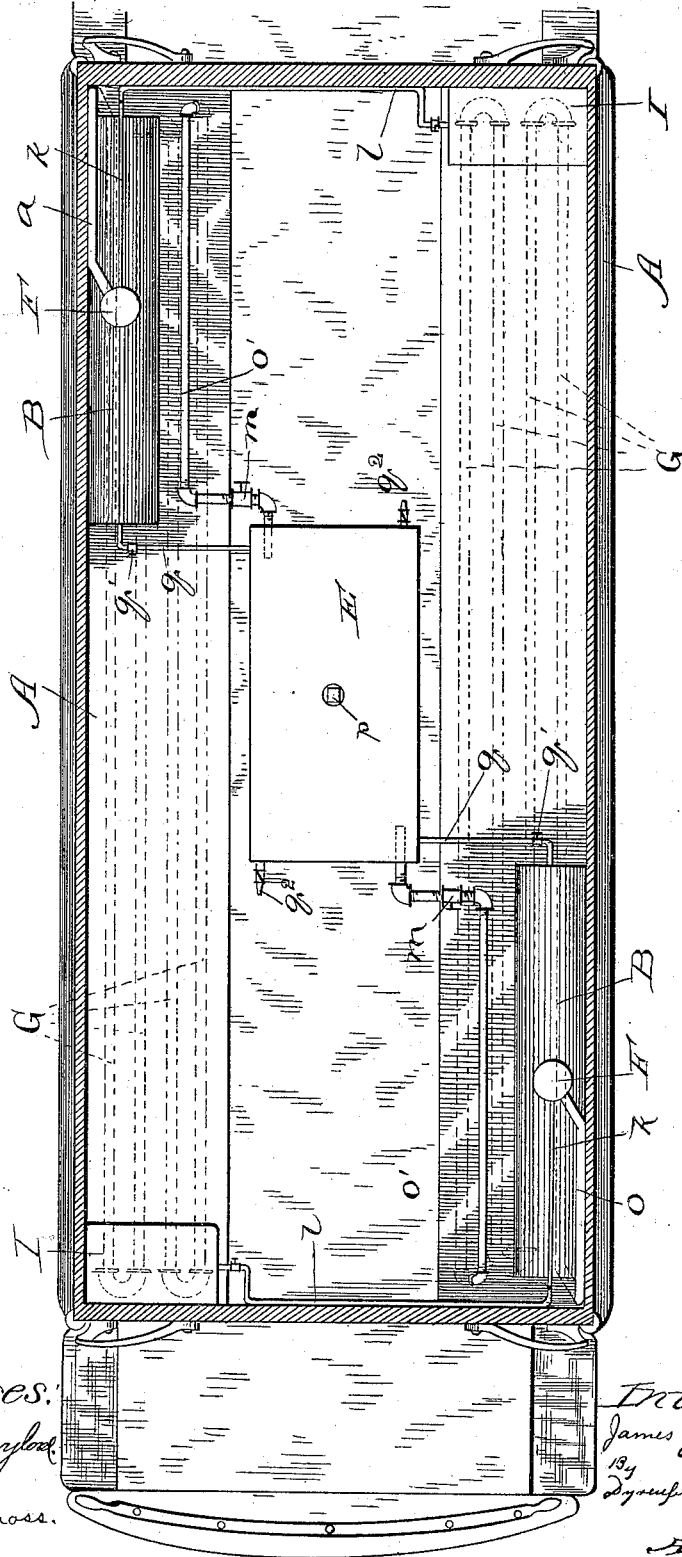
J. J. FLYNN.

STEAM HEATING APPARATUS.

No. 344,645.

Patented June 29, 1886.

Fig. 1.



Witnesses:  
*Chas. E. Gaylord*  
Mason Bros.

Inventor:  
James J. Flynn,  
By *Dyckman & Dyckman*  
Attorneys

(No Model.)

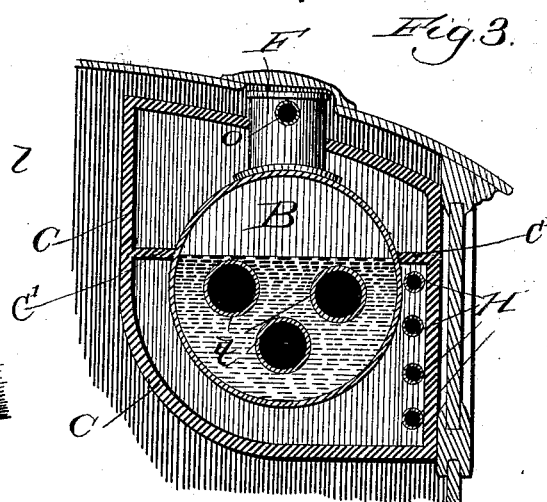
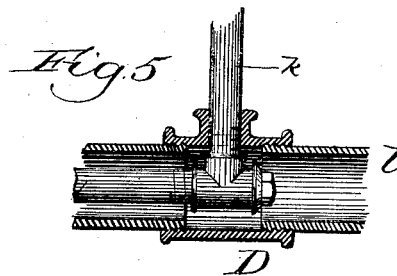
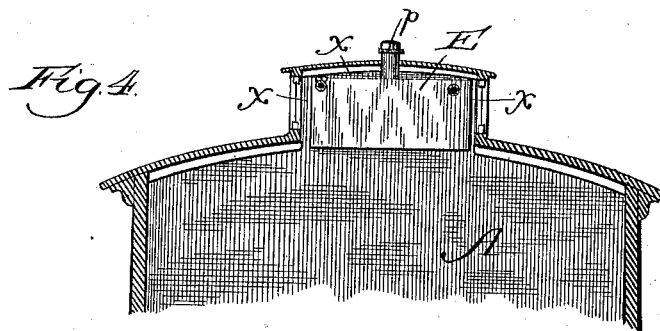
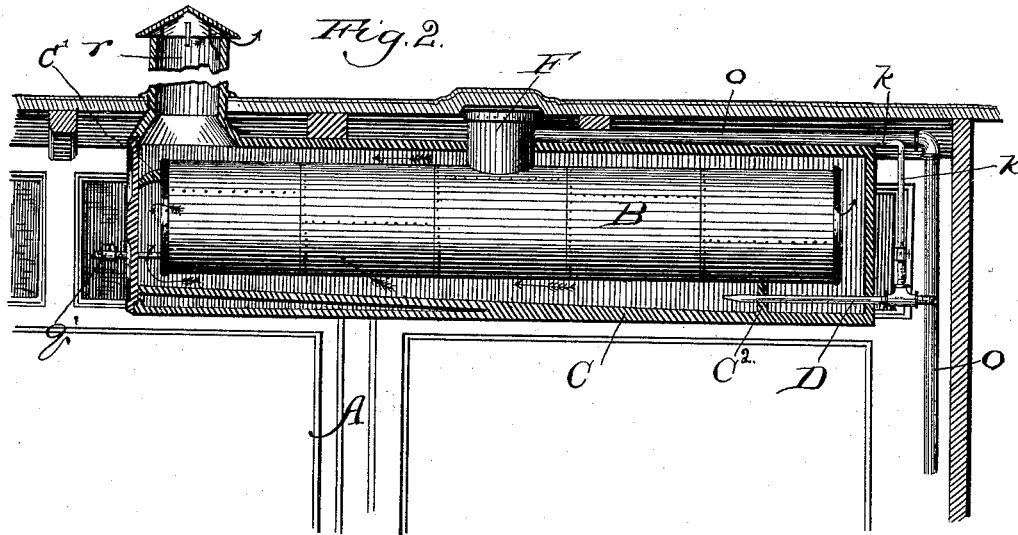
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Witnesses:  
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(No Model.)

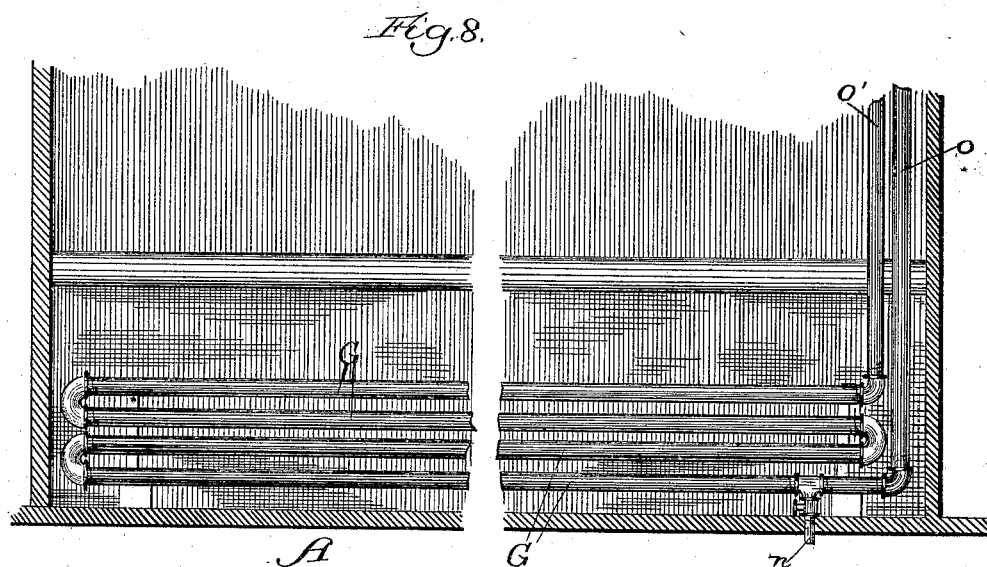
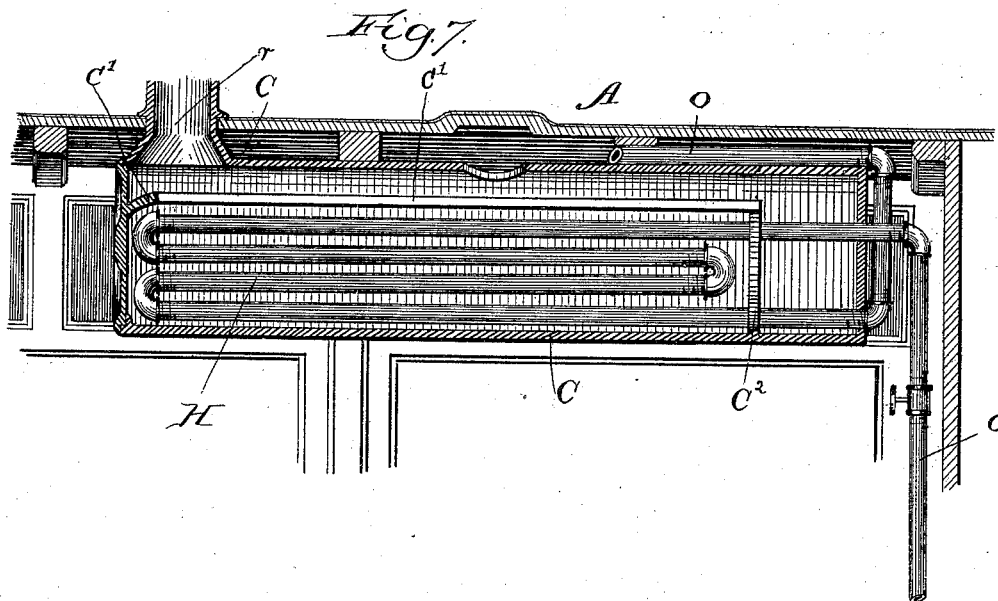
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STEAM HEATING APPARATUS.

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# UNITED STATES PATENT OFFICE.

JAMES J. FLYNN, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
THOMAS NOONAN, OF SAME PLACE.

## STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 344,645, dated June 29, 1886.

Application filed November 3, 1885. Serial No. 181,741. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES J. FLYNN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Heating Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of apparatuses wherein the heating medium is obtained by the combustion of a hydrocarbon oil, forming the fuel-supply introduced to the heating-chamber by means of a suitable injector; and my invention relates more particularly to the application of a steam-heating apparatus of the description above outlined for use on street-railway cars.

It is the principal object of my invention, though its use, as will hereinafter be pointed out, is not limited to such end, to provide a hydrocarbon steam-heating apparatus for use on street-railway cars, which shall obviate the disadvantages heretofore incident to the employment of warming devices with such vehicles, and which shall accomplish the desired end by means of a non-obstructing, compact, simple, inexpensive, and inexpensively operative mechanism.

My invention consists in the general construction of my improved device and in certain details of construction and combinations of parts forming the same, all as hereinafter more fully set forth.

Referring to the drawings, Figure 1 is a sectional plan view taken just below the roof of a street-railway car provided with my improved heating apparatus, and showing in dotted lines the arrangement of the radiating coils; Fig. 2, a vertical longitudinal sectional view of a portion of a street-railway car, showing a boiler and other details in position; Fig. 3, a cross-section of boiler, jacket, and steam-superheating device, taken near the steam-dome, and showing the latter in elevation; Fig. 4, a central cross-section through the roof of a street-railway car, showing in elevation the water-supply tank contained therein; Fig. 5, a detail view showing a broken portion of the injector; Fig. 6, a perspective view showing

nozzle of injector; Fig. 7, a view similar to Fig. 2, taken behind the latter, and showing a coil of pipe employed as a steam-superheater; and Fig. 8 a sectional view of a portion of a street-railway car, showing in elevation beneath the seat a coil of pipe arranged to form a vertical coil-radiator, instead of the horizontal coil-radiator shown by dotted lines in Fig. 1.

A represents the frame-work of a street-railway car, toward the upper portion of which, in one corner or in diagonally-opposite corners, as shown, are placed boilers B, preferably about five feet in length and eight inches in diameter, and provided each with a jacket, C, (shown in Figs. 2, 3, and 7,) completely surrounding the boiler, but divided longitudinally by a partition, C', (see Fig. 3,) fitting closely around the boiler, and affording between the said partition and the lower portion of the jacket a combustion-chamber, which is again divided by a lateral partition, C<sup>2</sup>, (see Fig. 2,) near the front end of the boiler and extending from the lower part of the jacket to the partition C'. An oil-burner in the form of an injector, D, hereinafter described, extends through the partition C<sup>2</sup> for each boiler, and the hot products of combustion from the burning hydrocarbon oil pass through the combustion-chamber around the lower portion of the boiler, following the course of the arrows, as indicated in Fig. 2, are returned by way of flues *t* within the boiler, and pass again over its upper surface, to escape thence through a stack, *r*.

E is a water-supply tank contained within the upper central portion of the car in the compartment usually occupied by the lantern, and arranged to leave spaces *x* between it and the windows ordinarily provided in this part of the car, to avoid obstruction to the ventilation. The tank E communicates with the boilers through supply-pipes *q*, having check-valves *q'*, and is provided with a removable cap, *p*, by removing which the tank may be filled through the roof of the car, and suitable cocks, *q*<sup>2</sup>, are provided upon the tank E to permit escape of air while the latter is being filled.

A steam-dome, F, of common construction,

is provided upon each boiler, B, and extends through the jackets C, above which it communicates through a pipe, *o*, passed downward near the corner of the car, with a radiating coil, G, beneath the seat, which coil may be arranged either horizontally, as shown by the dotted lines in Fig. 1, or vertically, as shown by full lines in Fig. 8, as desired, and a pipe, *o'*, passing upward near the pipe *o*, and communicating with the water-supply tank, returns to the latter the steam from the coils, which serves to heat the contents of the supply-tank, and thus completely utilizes all the heat generated and avoids waste of water.

15 A blow-off cock, *n*, is provided upon each coil G, for the usual purpose, and check-valves *m*, upon the pipes *o'*, prevent "back-set" from the water-supply tank.

If desired, the pipe *o* may be led back into the combustion-chamber, as shown in Figs. 3 and 7, and bent into the form of a superheating-coil, H, which affords advantage in the way of superior economy.

In diagonal corners of the car, toward the upper portion of the same and opposite the boilers B, are placed oil-supply tanks I, one for each boiler, and communicating with injectors D, hereinbefore mentioned, by way of pipes *l*, which latter form the casings for the injectors and extend through the partitions C<sup>2</sup> into the combustion-chambers in the form of flattened lips *l'*. (See Fig. 6.) A steam-supply pipe, *k*, communicating with the dome F, enters the injector D, as shown in Figs. 2 and 5, and impels the hydrocarbon oil into the combustion-chamber through the lip *l'* in the form of a fine spray, and perfect control of both steam and oil supply is afforded by means of suitable cocks in each pipe *l* and *k*.

To start the device, a door (not shown) is provided in the jacket C adjacent to the nozzle of the injector D, through which lighted paper or other suitable lighting medium may be inserted.

As hereinbefore mentioned, my device is not limited to its application as a heating apparatus for street-cars, but affords advantages wherever it is desired to maintain an equitable temperature in an apartment at moderate cost and under conditions hereinbefore specified. For these reasons my device is also well adapted for use with incubators, hot-houses, conservatories, and the like.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a compartment to be heated, of a boiler, B, a jacket, C, containing the boiler and forming the combustion-chamber, and supported adjacent to the roof of the said compartment, a radiating-coil, G, in the lower part of the compartment, a steam-dome, F, with which the coil G communicates, a water-reservoir, E, supported

within the said compartment adjacent to the roof thereof, and communicating with the boiler and with the discharge end of the coil G, and a suitable oil-burner for generating steam in the boiler with liquid fuel, substantially as set forth.

2. The combination, with a compartment to be heated, of a boiler, B, a jacket, C, containing the boiler and forming the combustion-chamber, and supported adjacent to the roof of the said compartment, a steam-superheating coil, H, within the jacket C, a steam-dome, F, with which the coil H communicates, a radiating-coil, G, in the lower part of the compartment communicating with the superheating-coil, a water-reservoir, E, supported within the said compartment adjacent to the roof thereof, and communicating with the boiler and with the discharge end of the coil G, and a suitable oil-burner for generating steam in the boiler with liquid fuel, substantially as set forth.

3. The combination, with a compartment to be heated, of a boiler, B, a jacket, C, containing the boiler and forming the combustion-chamber, and supported adjacent to the roof of the said compartment and provided with a stack, *r*, a radiating-coil, G, in the lower part of the compartment, a steam-dome, F, with which the coil G communicates, a water-reservoir, E, supported within the said compartment adjacent to the roof thereof, and communicating with the boiler and with the discharge end of the coil G, an oil-reservoir, I, supported within the said compartment adjacent to the roof thereof, and an injector, D, with which the reservoir I communicates, which extends into the jacket C and communicates with the steam-dome, substantially as described.

4. The combination, with a compartment to be heated, of a boiler, B, a jacket, C, containing the boiler and forming the combustion-chamber, and supported adjacent to the roof of the said compartment and provided with a stack, *r*, a steam-superheating coil, H, within the jacket C, a steam-dome, F, with which the coil H communicates, a radiating-coil, G, in the lower part of the compartment communicating with the superheating-coil, a water-reservoir, E, supported within the said compartment adjacent to the roof thereof, and communicating with the boiler and with the discharge end of the coil G, an oil-reservoir, I, supported within the said compartment adjacent to the roof thereof, and an injector, D, with which the reservoir I communicates, which extends into the jacket C and communicates with the steam-dome, substantially as described.

JAMES J. FLYNN.

In presence of—

MASON BROSS,  
WM. SADLER.