

(No Model.)

2 Sheets—Sheet 1.

J. E. HOWARD.

DEVICE FOR HEATING RAILWAY CARS BY STEAM.

No. 488,202.

Patented Dec. 20, 1892.

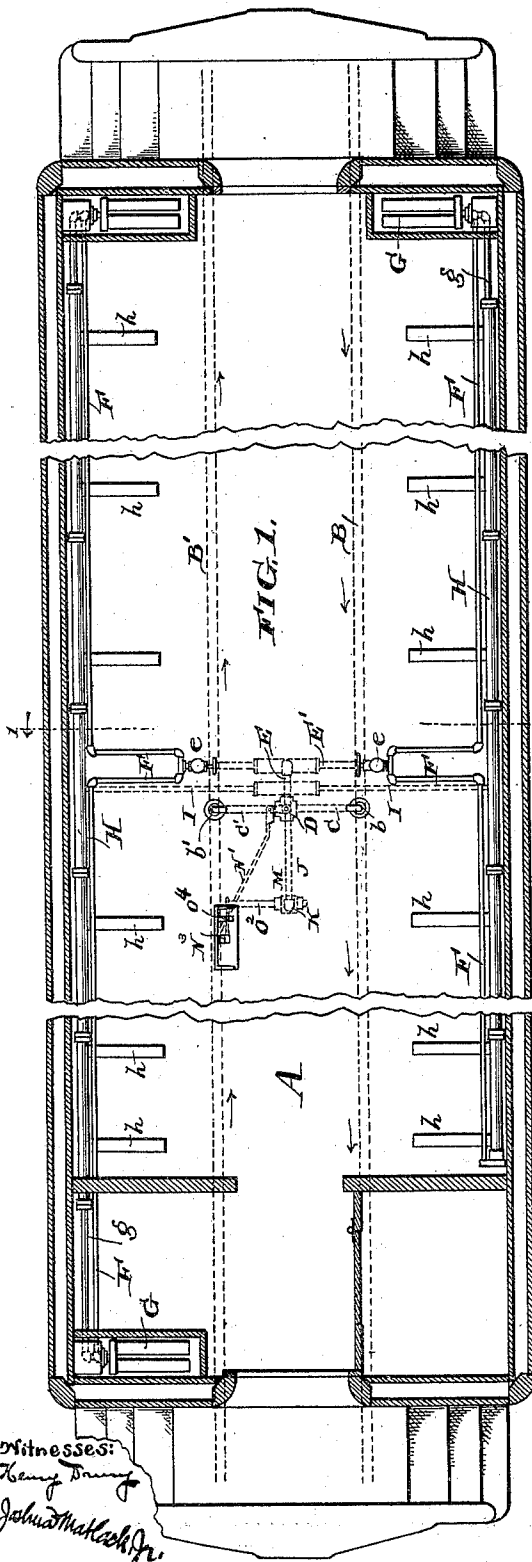


FIG. 4.

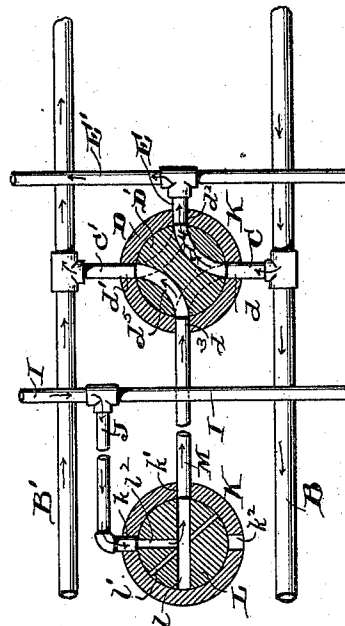


FIG. 5.

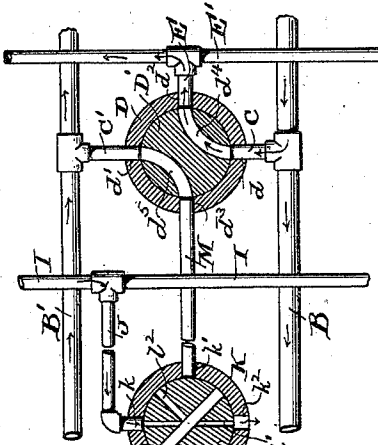
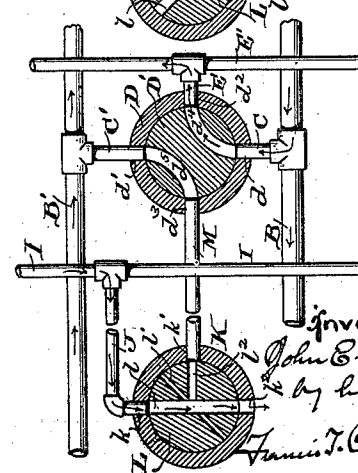


FIG. 6.



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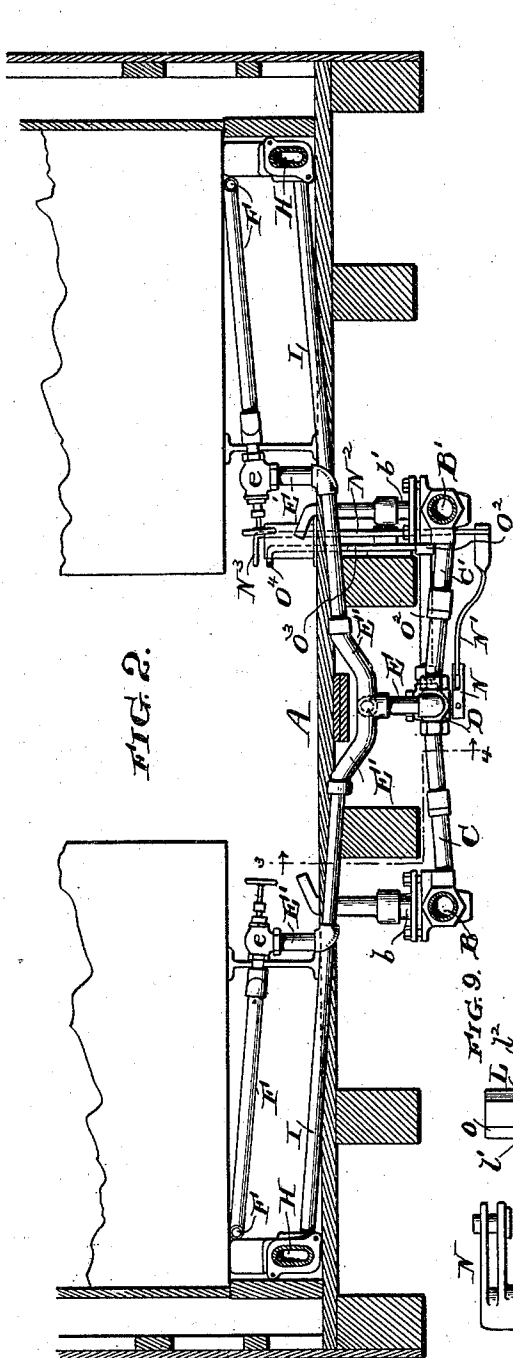


FIG. 2.

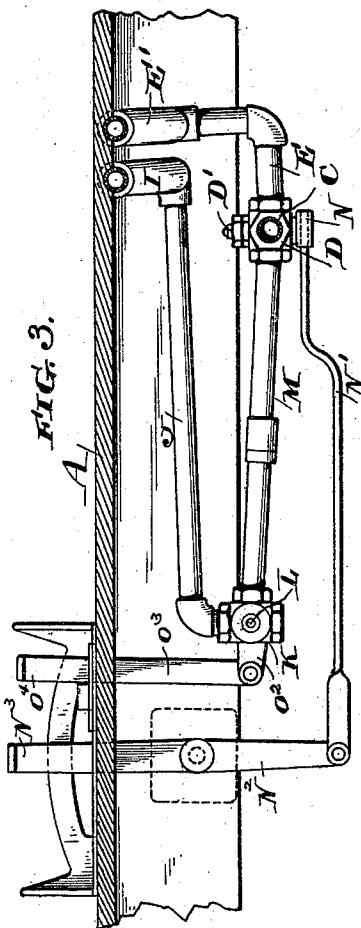


FIG. 3.

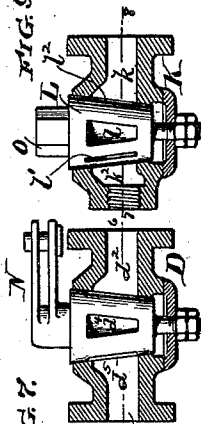


FIG. 7.

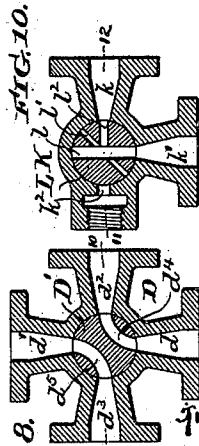


FIG. 10.

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# UNITED STATES PATENT OFFICE.

JOHN E. HOWARD, OF ALTOONA, PENNSYLVANIA.

## DEVICE FOR HEATING RAILWAY-CARS BY STEAM.

SPECIFICATION forming part of Letters Patent No. 488,202, dated December 20, 1892.

Application filed September 15, 1891. Serial No. 405,743. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN E. HOWARD, a subject of the Queen of Great Britain, residing at Altoona, county of Blair, State of Pennsylvania, have invented a certain new and useful Improved Device for Heating Railway-Cars by Steam, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the steam heating apparatus of railway cars and particularly to such devices as are used for heating a train of cars with steam derived from a single source of supply—generally the locomotive boiler.

I may further state that my improvement is intended for use with such devices only as employ a double line of steam pipes either of which may serve as the source of steam supply to the car while the other is adapted for use as a return conduit for exhaust steam and water of condensation.

The object of my invention is to provide simple and efficient mechanism by which the radiator system within the car may be connected with either of the steam pipes and by which the exhaust steam and water of condensation can be readily directed either into the pipe used as a return pipe or to the atmosphere or by which the whole system can be drained. The nature of my improvement will be best understood as described in connection with the drawings in which it is illustrated and in which,—

Figure 1 is a plan view illustrating a car equipped with my improvement. Fig. 2 is a cross-sectional view taken on the line 1—2 of Fig. 1. Fig. 3 a longitudinal section on the line 3—4 of Fig. 2. Figs. 4, 5 and 6 are diagrams illustrating the various operative combinations of the two valves which constitute the essential novel feature of my invention. Fig. 7 is an elevation of one of the valves, the valve casing being sectioned on the line 9—10 of Fig. 8. Fig. 8 is a cross-section of said valve on the line 5—6 of Fig. 7. Fig. 9 is an elevation of another of the valves the casing being sectioned on the line 11—12 of Fig. 10; and Fig. 10 a cross-sectional view of this valve taken on the line 7—8 of Fig. 9.

A is the car body; B and B' steam pipes secured beneath the car and adapted by any of the well-known contrivances to couple with

similar pipes on other cars or on the locomotive; from each of these pipes which I will call the train pipes lead pipe connections C and C' connecting respectively with the ports  $d$  and  $d'$  of a valve casing D.

$b$  and  $b'$  Figs. 1 and 2 are cocks situated at the junction of the train pipes B B' with pipes C C' and by which the train pipes B and B' can be at will closed beyond the points of junction. The use of these valves is not novel with me but is well understood in the art and they therefore need no further description or illustration.

D D' is a four-way valve consisting of a casing D having the four ports  $d$   $d'$   $d^2$  and  $d^3$ ; with the ports  $d$  and  $d'$  are connected the pipes C and C' as already stated; the port  $d^2$  connects with the supply pipe leading to the radiator system situated within the car body; this supply pipe as shown consists of the pipe E and the pipe E' connecting with it and which connects in turn with the pipes F— $e$  and  $e$  being valves by which the supply conduit can be closed on either or both sides of the car. The pipes F connect with the radiator conduits H H having preferably extensions  $h$  the steam being led into pipe H at its extreme ends from which it passes toward the center and is drawn off at the lowest point through the drain-pipes I I. As shown at one end of each side of the car the steam enters a radiator G and thence through a pipe  $g$  connects with the radiator pipe H.

To return to the valve D D' I will further state that its port  $d^3$  is connected with the drain conduit or conduits of the radiator system. As shown this connection is made by means of pipe M which connects with pipes I through the medium of the valve-casing K and valve L to be hereinafter described.

D' is a cock working in casing D and having formed in it passages  $d^4$  and  $d^5$ , formed as shown in the drawings and by means of which the ports in the valve casing can be connected as shown in the drawings; that is to say, ports  $d$  and  $d^2$  connected together and ports  $d'$  and  $d^3$  connected together; or, by means of which, the cock being turned to an angle of ninety degrees, the ports  $d'$  and  $d^2$  are connected together and the ports  $d^3$  and  $d$  connected together; the last-mentioned arrangement being indicated by dotted lines in Fig. 4.

Referring now to the valve K L, which may be called a three-way cock, the casing K having three ports  $k$   $k'$   $k^2$ —the first,  $k$ , connected with the drain pipe I by means of the connection J, the second,  $k'$ , connecting with port  $d^3$  of valve D D' by means of pipe M, and the third,  $k^2$ , opening to the atmosphere. The plug cock L working in casing K is provided with three passages  $l$   $l'$  and  $l^2$ ; of these the port  $l$  is the largest in area and leads directly through the cock L being arranged so that it will connect ports  $k$  and  $k^2$  when the cock is turned to make that connection; the passage  $l'$  also directly through the cock so as to connect the ports  $k$  and  $k^2$  when such a connection is desired; and it is immaterial whether or not the ports  $l$  and  $l'$  connect with each other or not though I may state that they have no conjoint operative function. The third port,  $l^2$ , connects with port  $l$  and is arranged so that it will open into port  $k'$  when passage  $l^2$  connects with port  $k'$ . The passage  $l^2$  is of a cross-sectional area preferably considerably less than that of passage  $l$  the object in so restricting it being to offer a considerably greater resistance to the passage of steam and flow of water from the drain pipe of the radiator system; and the passage  $l'$  is preferably again of considerable similar area than the passage  $l^2$ .

The cock D' is operated from the inside of the car. As shown a lever arm N attached to the cock is connected by means of a rod N' with a pivoted lever N<sup>2</sup>, the end N<sup>3</sup> of which extends into the car, the whole arrangement being such that by pushing the end N<sup>3</sup> in one direction or the other the cock is made to form connections either as shown in the full or in the dotted lines of the diagram Fig. 4. In practice steam is always taken through the steam pipe situated on one side of the car looking forward toward the engine; this may be either the pipe B or the pipe B' and I arrange the valve mechanism so that by thrusting the end N<sup>3</sup> of lever N<sup>2</sup> forward toward the engine the right connection is always made. The cock L is operated as shown in the drawings by means of a rod O' which fits on a properly prepared end O of the cock L and which has secured to it a lever arm O<sup>2</sup> with which connects an upright operating arm O<sup>3</sup>, the end O<sup>4</sup> of which extends into the car body at a point close to the end N<sup>3</sup> of the lever N<sup>2</sup>.

The operation of the steam-heating apparatus embodying my improvement can be readily followed from the diagrams Figs. 4, 5 and 6. Assuming in the first place that the steam supply is coming through the pipe B it will be seen that the cock D' is turned so as to connect the ports  $d$  and  $d^2$  together and also to connect together the ports  $d'$  and  $d^3$ ; steam therefore passes from pipe B through pipe C and port  $d$ , then through passage  $d^4$  and port  $d^2$ , through pipes E and E' pipes F to the radiator system within the car; thence the exhaust steam and water of condensation passes to the drain pipes I I, and thence through connecting pipe J to port  $k$  of the valve K L. If

now the system is to be used as a return system, that is to say, a system in which the steam and water of condensation is drawn back to or toward the locomotive by means of a pump or similar device situated on the locomotive or tender, the cock L is turned to the position shown in Fig. 4, the steam and water passing through port  $k$  into passage  $l^2$ , thence into passage  $l$ , thence through port  $k^2$  to pipe M which connects with port  $d^3$  of valve D D', the steam and water passing through the passage  $d^5$  to the port  $d'$ , and thence through connection C' to the drain pipe B' which connects with the pump or similar device before mentioned but which is not illustrated in the drawings. The sectional area of the port  $l^2$  is determined by the amount of resistance which it is found advisable in practice to offer to the escape of steam and water from the radiator system. When for any reason it is desirable that the exhaust steam and water of condensation should not be returned to or toward the locomotive the cock L is turned to the position shown in diagram Fig. 5; that is to say, to a position where the ports  $k$  and  $k^2$  will be connected by the passage  $l'$ . In this position of the valve the steam and water of condensation escapes directly to the atmosphere, all connection with the pipe B' being cut off. The area of the port  $l'$  is determined as before while the amount of resistance it is desirable to offer to the escape of steam and water from the radiator system. When it is desired to drain the steam and water from all the parts of the heating apparatus the cock L is turned to the position shown in diagram Fig. 6; in this position the large passage  $l$  connects the ports  $k$  and  $k^2$  so that the whole contents of the radiator system can escape freely to the atmosphere and at the same time the port  $k'$  is connected with the exhaust port  $k^2$  through the passage  $l^2$  and  $l$  so that all water and steam is permitted to escape freely from the drain pipe B or B' with which the pipe M is connected through cock D'. As already stated this connection with either pipe B or B' is made by simply moving the cock D' through an angle of ninety degrees as indicated in diagram Fig. 4.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is:

In a railway car the combination of a double line of steam pipes D D' adapted to connect with a source of steam supply as described, a radiator system within the car body provided with supply and drain pipes; a valve casing K having a port  $k$  connecting with the drain pipe; a port  $k^2$  opening to the air and a port  $k'$  connecting to the return steam pipe and a plug valve L turning in said casing K and having the ports  $l$   $l'$   $l^2$  formed and arranged as described.

JOHN E. HOWARD.

Witnesses:

LEWIS R. DICK,  
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