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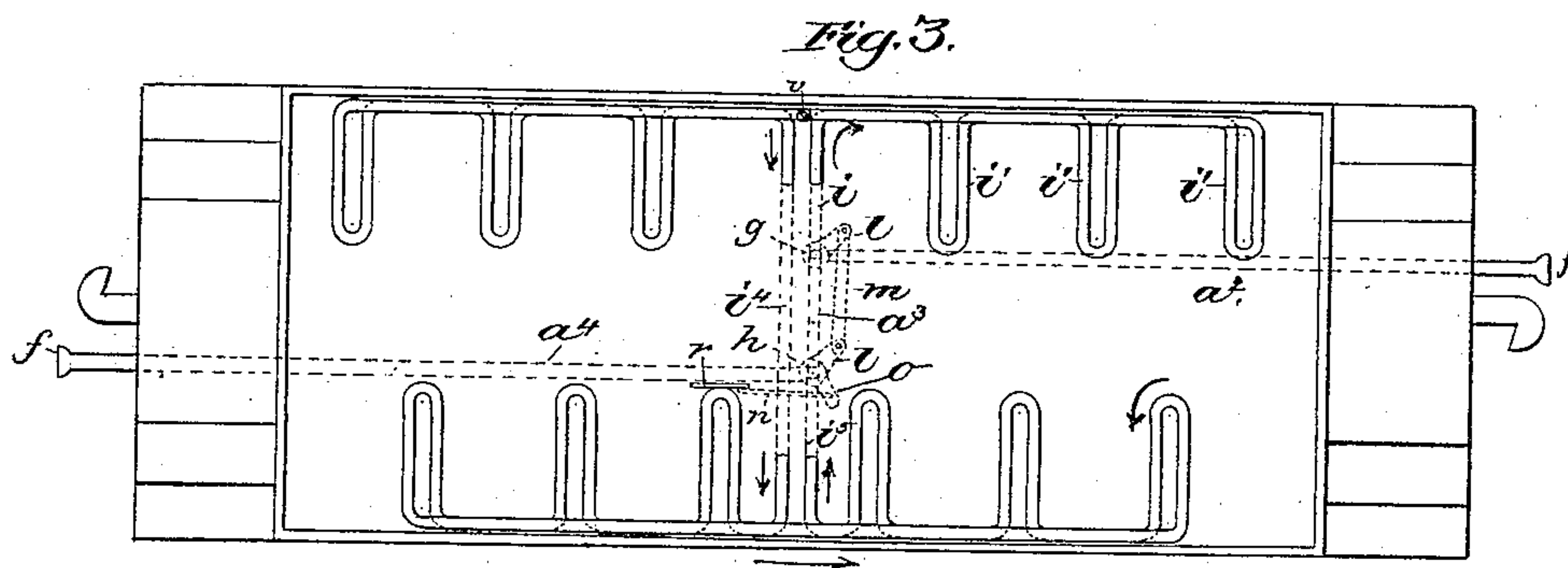
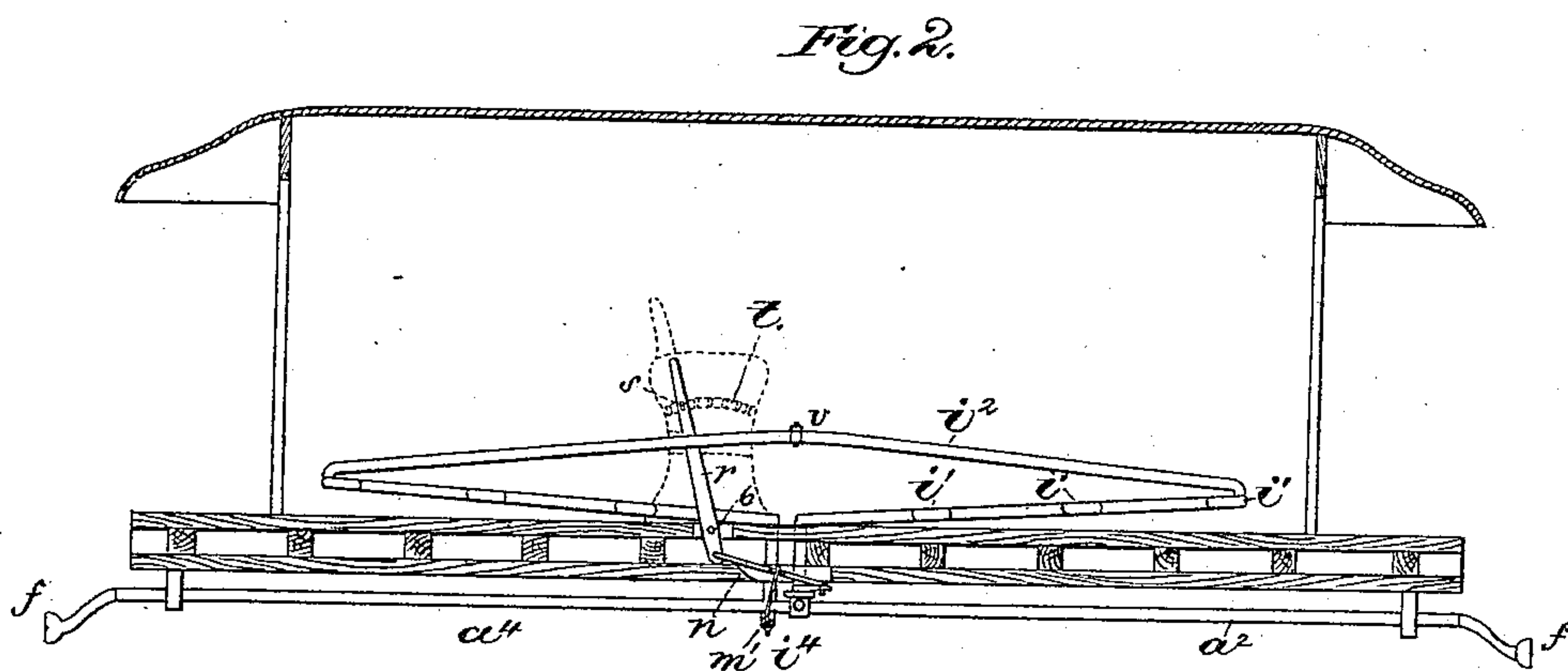
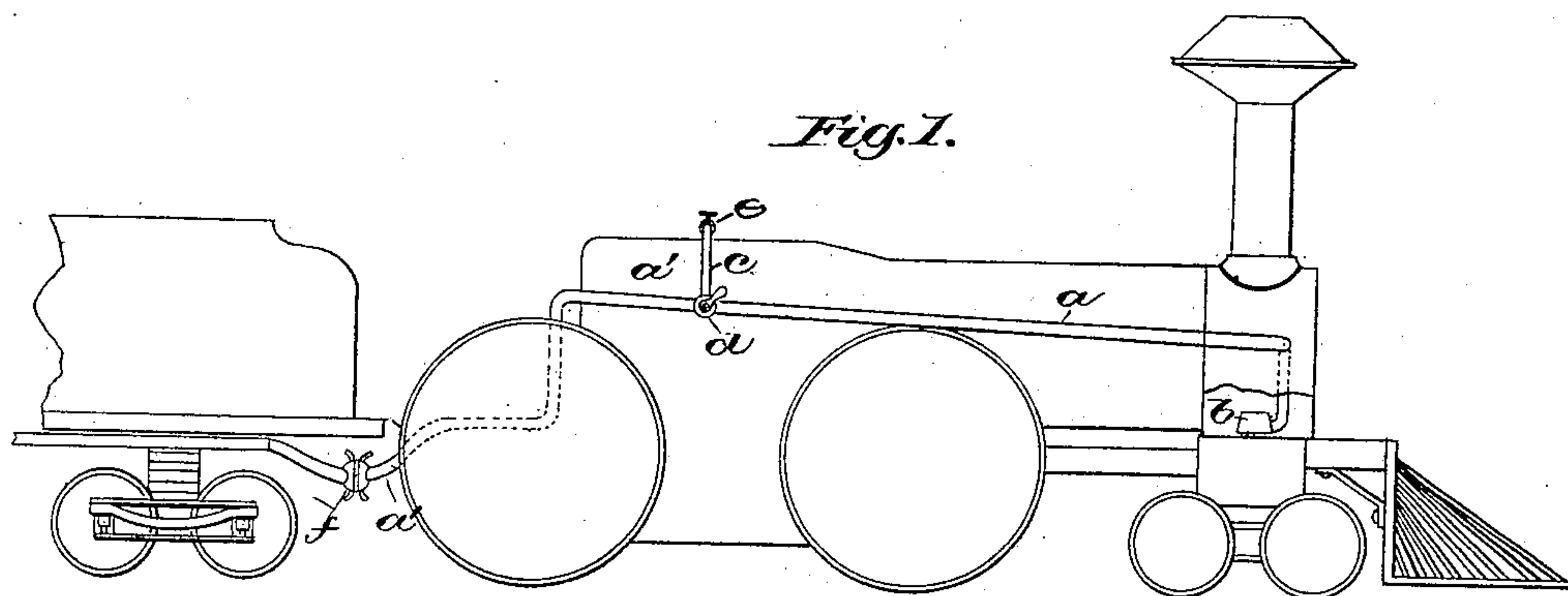
2 Sheets—Sheet 1.

D. D. & J. H. SEWALL.

CAR HEATING APPARATUS.

No. 265,284.

Patented Oct. 3, 1882.



Witnesses.

John F. B. Pomeroy  
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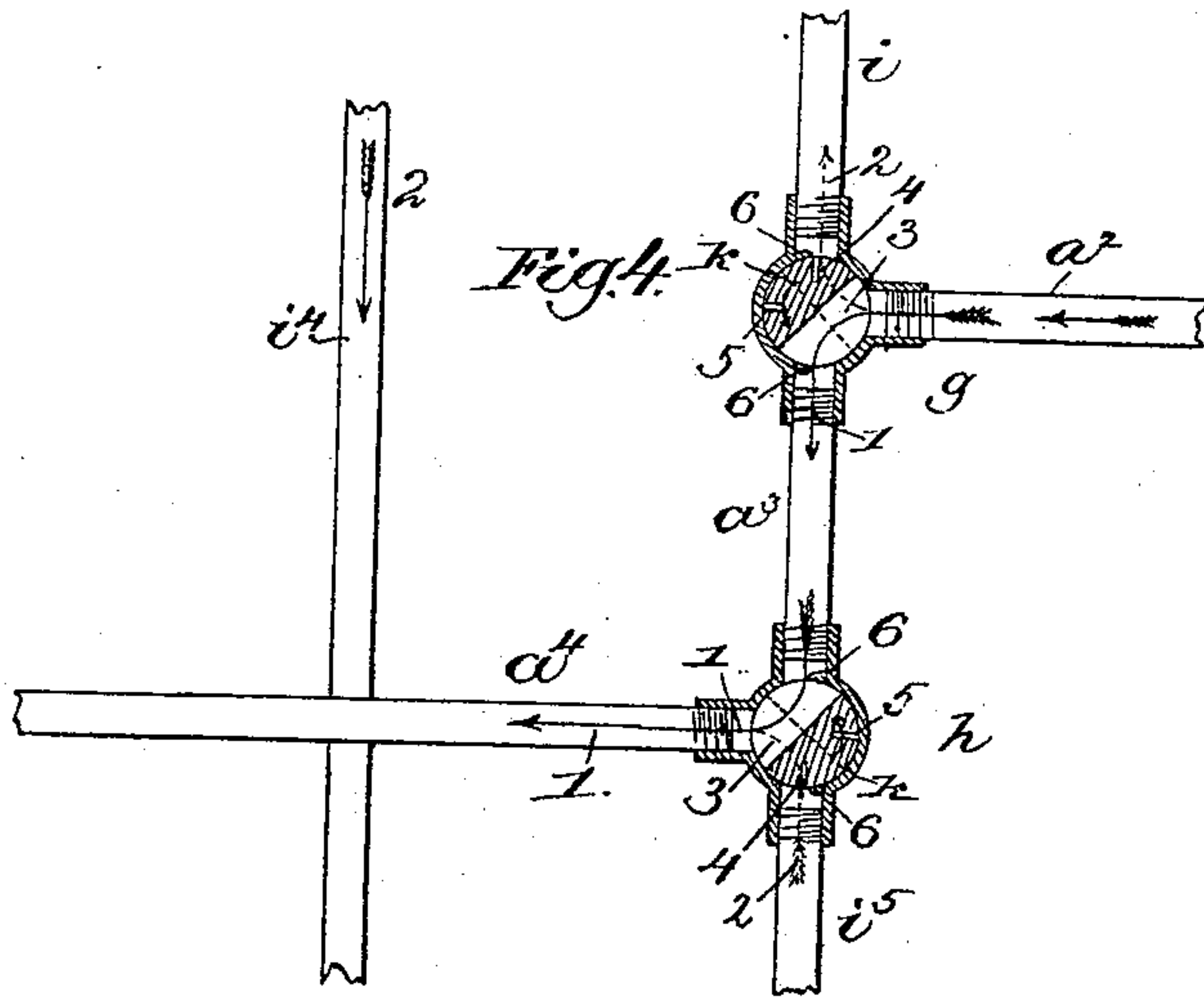


Fig. 5.

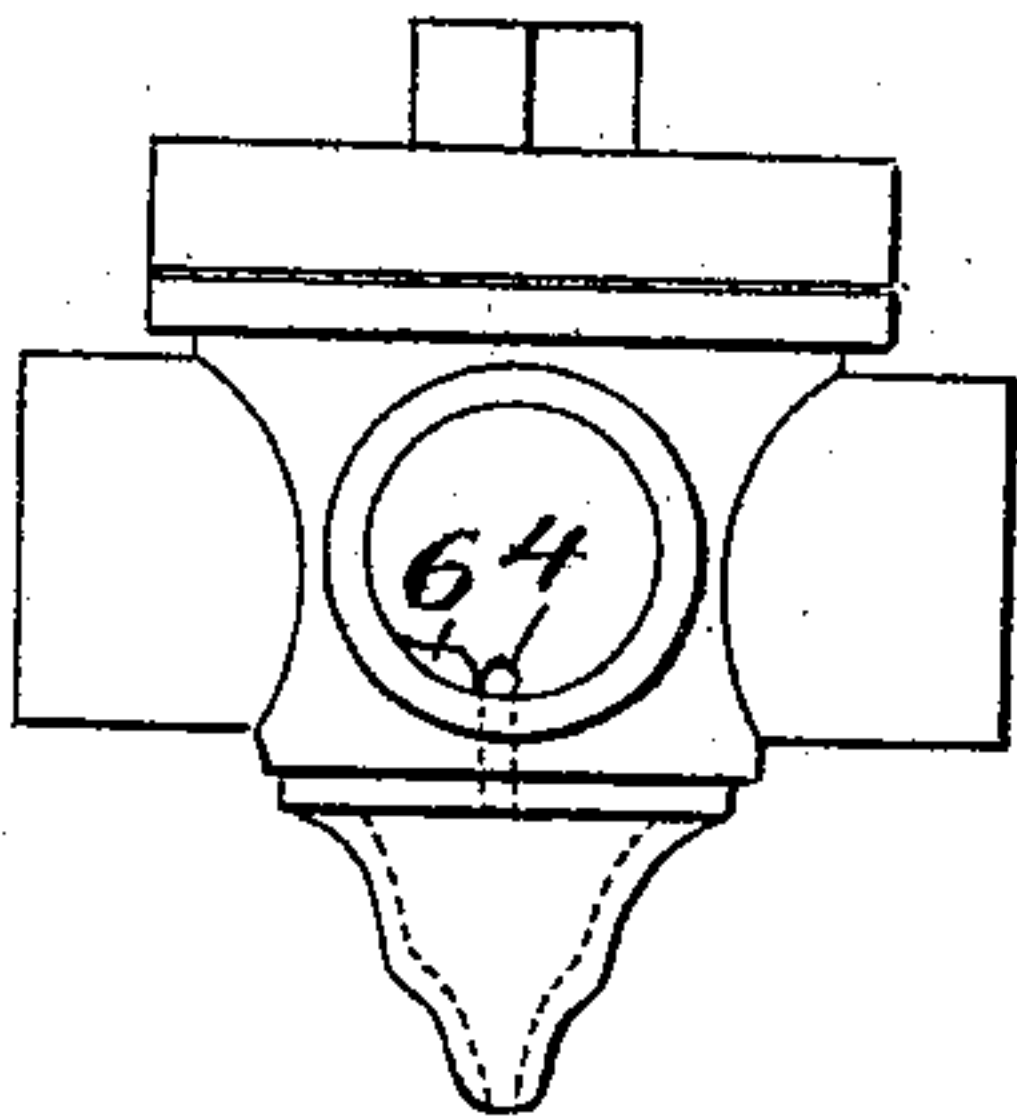
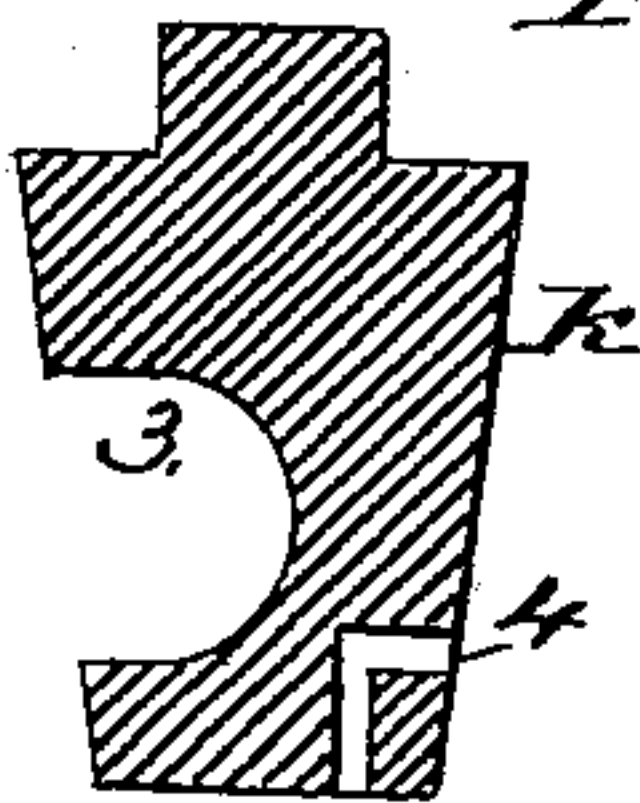


Fig. 6.



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# UNITED STATES PATENT OFFICE.

DANIEL D. SEWALL, OF AUGUSTA, AND JAMES H. SEWALL, OF PORTLAND,  
MAINE.

## CAR-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 265,284, dated October 3, 1882.

Application filed April 27, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, DANIEL D. SEWALL and JAMES H. SEWALL, of Augusta, county of Kennebec, and Portland, county of Cumberland, and State of Maine, respectively, have invented an Improvement in Apparatus for Heating Cars, of which the following description, in connection with the accompanying drawings, is a specification.

Our invention relating to apparatus for heating cars is embodied in apparatus of that class in which the exhaust or live steam from the locomotive is caused to circulate through pipes in the cars, and has for its object to control the distribution of the heat in the different cars of the train being heated.

The invention consists partly in a novel arrangement of the circulating-pipes, and in the combination, with the said circulating-pipes, of controlling-cocks, whereby the entire flow of steam may be caused to pass through the circulating-pipes of each car, or may be wholly or partly cut off therefrom without the possibility of at any time cutting off the said steam from the other cars of the train. Thus when the steam is shut out from the circulating-pipes of one car it passes directly to the next car to the rear, where it may either be caused to pass through the circulating-pipes or may be cut off therefrom and conveyed directly to the next car to the rear, and so on to the end of the train, where the pipe is left open, so that the steam may escape freely, there never being any pressure in the pipes. The stop-cocks are so arranged that when they cut off the steam from the circulating-pipes or separate the said circulating-pipes from the main feeding-pipes a drip-passage will be opened from the said circulating-pipes to permit the water of condensation to escape, the said pipes being so arranged as to cause the liquid to flow toward the said drip-passages. The steam is conveyed by a main pipe, connected by the usual coupling, from car to car through the train, the said pipe entering near the middle of each car a transverse pipe which is controlled by a three-way cock, one branch of the said transverse pipe leading directly to another similar three-way cock and the main pipe leading to the next car upon the train. When the two cocks, which are connected so as to be operated simultaneously, are in one position, the steam passes directly from one to the other

and to the next car in the train without heating the car upon which the said cocks are in the said position. The other passages from the said three-way cocks are connected with circulating-pipes entering the car near its middle on one side, thence passing by a tortuous pipe, making a bend under each seat of the car, to one end of the car, then by a direct pipe to the other end, then back by the zigzag pipe to the middle of the car, where it crosses and passes in a similar manner through the other side of the car, where it finally has its exit into the passage controlled by the second three-way cock in connection with the main pipe leading to the next car. By placing the cocks in an intermediate position the flow of steam is divided, any desired portion having a direct passage, and the remainder passing through the circulating-pipes.

Figure 1 is a side elevation of a sufficient portion of a locomotive provided with apparatus for supplying steam for heating the cars to illustrate this invention; Fig. 2, a longitudinal sectional elevation of a car provided with heating apparatus constructed in accordance with this invention; Fig. 3, a plan view thereof; Fig. 4, an enlarged detail, showing the manner in which the course of the steam is controlled by the cocks; and Figs. 5 and 6, details illustrating the construction of the cocks.

The main supply-pipe is shown at *a* in Fig. 1 as leading from the exhaust-pipe *b* of the engine, it having a branch, *c*, connected with the boiler and controlled by suitable cocks or valves, *d e*, to enable live steam to be used when the engine is not running or when the exhaust-steam is not sufficient. The valve *d* is so arranged as to connect the portion *a* of the pipe leading from the exhaust-pipe *b* to the said valve with the portion *a* thereof leading toward the train, or to cut off the connection between the portions *a a'*, and at the same time form a connection between the pipe *c* and the pipe *a'*, when the flow of live steam will be controlled by the regulating-valve *e*.

The steam conducting or supplying pipe of each car consists of an inlet portion, *a*<sup>2</sup>, leading from the end of the car nearest the locomotive into a three-way cock, *g*, near the middle of the car, directly connected by a short pipe, *a*<sup>3</sup>, with a second three-way cock, *h*, from which another direct passage is afforded by the outlet portion *a*<sup>4</sup> of the main pipe to the end of the car most re-



mote from the locomotive, where the said pipe is connected by the coupling  $f$  with the pipe  $a^2$  of the next car. From the side of the three-way cock opposite to the pipe  $a^3$  leads the circulating-pipe  $i$ , which passes up through the bottom of the car to the interior thereof, and extends to the end of the car, a loop being formed under each seat thereof, as shown at  $i'$ . From the end of the car the said pipe  $i$  is continued by a direct pipe,  $i^2$ , to the other end of the car on the same side, from which the said circulating-pipe returns with a similar series of loops,  $i'$ , to the middle of the car, where it passes down beneath the car and across it, as shown at  $i^4$ , after which it again enters the car, passes by a series of loops to one end thereof, thence directly to the other end, and back by another series of loops to the middle of the car, where it enters the three-way cock  $h$  on the side opposite to the portion of pipe  $a^3$ , as shown at  $i^5$ , Figs. 3 and 4.

The circulating-pipes are arranged as shown in Fig. 2, having a gradual descent from the middle of the straight portion  $i^2$  of the pipe toward the transverse portions which pass beneath the car, and are connected with the three-way cocks  $g$   $h$ , or with the transverse portion  $i^4$  of the circulating-pipe, so that all the water of condensation will flow downward toward the said three-way cocks and transverse pipe  $i^4$ . The three-way cocks  $g$   $h$  each consist of a chamber having three openings connected with the main and circulating pipes, as shown in Fig. 4, and containing the cock plug or spindle  $k$ , having a hole or port, 3, arranged to connect one of the said openings with either of the others or to connect it partly with both of the others. Thus when the cock  $g$  is in the position shown in full lines, Fig. 4, it connects the pipe  $a^2$  with the pipe  $a^3$ , and the steam flows as indicated by the arrows 1, the cock  $h$  at the same time being in position to connect the pipe  $a^3$  with the pipe  $a^4$ . The operating-levers  $l$  of the two cocks (see Fig. 3) are connected together by the link  $m$ , so that both are moved simultaneously. When the cocks are in the position shown in full lines, Fig. 4, the circulating-pipes  $i$  and  $i^5$  are closed, and small drip-passages 4, formed in the body of the cock-spindles  $k$ , are connected with the said pipes, the said passages leading down through the said spindle  $k$  and permitting the water of condensation to flow out from the said circulating-pipes. When the cocks  $l$  are turned in the direction of the arrows thereon about at right angles to the position shown in full lines, Fig. 4, the pipe  $a^2$  is connected with the pipe  $i$  and the pipe  $i^5$  is connected with the pipe  $a^4$ , so that the steam now flows as indicated by the arrows 2, traversing the circulating-pipes  $i$   $i'$   $i^2$   $i^4$   $i^5$  and heating the car. In this position of the cocks  $g$   $h$  a drip-passage, 5, in one or both of them is brought into connection with the pipe  $a^3$ . When the cocks are in an intermediate position the pipe  $a^2$  will be connected both with the pipe  $a^3$  and with the circulating-pipe  $i$ , and the pipe  $a^4$  will be connected both

with the pipe  $a^3$  and the pipe  $i^5$ , so that the steam will be permitted to flow as indicated by both the arrows 1 and 2, the proportionate amounts passing by either path being regulated by the position of the said cocks. The drip-passages 4 and 5 open into the lower portion of the corresponding pipes, and are arranged to be covered and closed by shoulders 6 in the cock-chambers in the movement of the stop-cock before the corresponding portion of the pipe is uncovered by the cock-spindle  $k$  or brought into communication with the main pipe  $a^2$  or  $a^4$ , so that the steam will never have a free passage from the said main pipes out through the said drip-passages.

The transverse portion  $i^4$  of the circulating-pipe is provided at its lower side with a drip-cock,  $m'$ , operatively connected with the link  $n$  of the operating mechanism of the cocks  $g$   $h$  in such manner that when the said cocks close the passage from the main pipes  $a^2$   $a^4$  to the circulating-pipes  $i$   $i^5$ , and open the direct passage through the pipe  $a^3$ , as shown in full lines, Fig. 4, the said drip-cock will be opened, thus permitting the entrapped steam and water of condensation to escape from that portion of the circulating-pipes draining toward the said transverse pipe  $i^4$ .

The movement of the cocks  $g$   $h$ , controlling the heating of the corresponding car, may be accomplished by any suitable mechanism. As herein shown, a crank-arm,  $o$ , fixed upon one of the cock-spindles, is connected by the link  $n$  with a lever,  $r$ , pivoted at 6 near the floor of the car, the said lever extending up by the side of one of the car-seats, as shown in Fig. 2, and being provided with a projection,  $s$ , which may be engaged with notches in a segment,  $t$ , formed at the side of the car-seat, to hold the said levers and the connected stop-cocks in any desired position.

It will be seen that under all circumstances the steam has a passage from the pipe  $a^2$  to pipe  $a^4$ , and thence to the pipe  $a^2$  of the next car, and so on to the last car of the train, and that the whole or any desired portion of the steam may be caused to pass through the circulating-pipes of each car. The pipe  $a^4$  at the end of the last car is left open to permit the escape of water or of the steam which may not have been condensed in passing through the cars. It will be seen that no pressure can be brought upon the said pipes, so that there is no danger of an explosion.

By the herein-described arrangement a perfect circulation of the steam and distribution of the heat is afforded, and also a perfect drainage of the pipes, so that there can be no derangement from freezing, and that the amount of heat for each car can be controlled without interfering with the heating of the other cars of the train.

It will be seen that, regarding the apparatus connected with one car by itself, the portion  $a^2$  of the main pipe may be considered as an inlet-pipe and the portion  $a^4$  as an outlet-pipe, as they operate as an inlet and outlet, respectively,



to the circulating-pipes of the said car, and by the term "main inlet-pipe" we mean the pipe by which the steam is conveyed from the locomotive into the circulating-pipe of a given car, and by the term "outlet-pipe" we mean the pipe by which the steam is conveyed from the same circulating-pipe toward the next car or into the atmosphere at the rear of the train. The highest portion of the distributing-pipe, as  $v^2$ , is provided with an inwardly-opening check-valve,  $v$ , to permit air to enter when the steam is shut off, so as to prevent the water of condensation from being retained in the pipes by the atmospheric pressure at the drip-passage opening.

We are aware that a car-heating apparatus has been heretofore invented in which each car is provided with a heater for a circulating fluid and with radiating-pipes for the said fluid both within and outside of the car, and means to cause the circulating fluid to pass through either of said radiators; but in such apparatus the heat which is not used inside the car is radiated into the atmosphere outside and wasted, and, moreover, with such apparatus it is necessary to maintain a fire upon each car, which is expensive, and greatly increases the danger in case of an accident to the cars, both of which objections are overcome by our invention.

An apparatus has been invented by which a series or train of cars may be heated by steam from the locomotive, and each car is provided with a radiator in the car and a direct connection outside of the car from the next car in front to the next car toward the rear, and we do not broadly claim such external connection and internal radiator; but in the said apparatus the means for controlling the passage of the steam within or without the car is such that both paths for the steam may be obstructed at the same time on a given car, thus cutting off the supply of heat for all the cars to the rear thereof—a thing which cannot take place with our apparatus, in which the controlling mechanism is such that one passage is automatically opened in proportion as the other is closed, and the heat-radiating medium when diverted from one car is conveyed to the others, so that the minimum amount of heat is wasted.

We are also aware that cocks have been made by which a drip or outlet passage is afforded for the pipes when the said pipes are otherwise closed or the supply of fluid cut off from them by the shutting of the cocks, and we do not broadly claim a cock provided with such an outlet-passage; nor do we broadly claim providing a pipe with an outlet or drip-passage for emptying it when it is cut off from the supply by which it is filled.

We claim—

1. In an apparatus for heating cars, the main supply-pipe consisting of inlet and outlet portions upon each car to be heated, the said inlet portion being connected with the source of steam and the said outlet portion conveying the steam to the next car from the source of steam, combined with a direct connecting-pipe

and a circulating-pipe passing through the interior of the car, each adapted to be placed in the steam-circuit between the said inlet and outlet portions of the main pipe, and cocks to control the passage of the steam from the said inlet-pipe through the said circulating or direct pipes, or both, to the outlet-pipe, and mechanism for operating the said cocks simultaneously, whereby any desired portion of the steam may be caused to traverse the circulating-pipe, and a passage is automatically afforded for the remainder through the direct pipe from the inlet to the outlet portion of the main pipe upon each car.

2. The inlet and outlet pipes and three-way cocks having one passage connected therewith, combined with a direct pipe connecting other passages of the said three-way cocks, a circulating-pipe interposed between the third passages of the said cocks, and means to operate the said cocks simultaneously, whereby they simultaneously afford an equal communication between the said inlet and outlet pipes and the direct or circulating pipes, substantially as and for the purpose described.

3. The main inlet and outlet pipes, and the circulating and direct pipes interposed between them, combined with three-way cocks for controlling the passage from the said inlet and outlet pipes to the said circulating or direct connecting-pipe, the said cocks being provided with drip-passages which are brought into communication with the said circulating-pipes when they are cut off from the main pipes, substantially as described.

4. The main inlet and outlet pipes, the circulating-pipes, and direct pipes, combined with two cocks to control the said pipes, and the actuating-lever and connecting-link therefor, whereby both the said cocks are actuated simultaneously, substantially as described.

5. The main inlet and outlet pipes, and the circulating-pipe entering the car near its middle, thence passing under each seat on one side to the end, thence directly to the other end, and back therefrom under each seat to the middle, thence across to the other side of the car and therethrough with a similar arrangement, combined with means to control the connection of the said inlet-pipe with one end of the said circulating-pipe, and of the outlet-pipe with the other end of the said circulating-pipe simultaneously, substantially as described.

6. The main inlet and outlet pipes and circulating-pipe and the controlling-cocks therefor, combined with an independent drip-cock connected with the said circulating-pipe, and mechanism whereby all the said cocks are operated simultaneously with the said controlling-cocks, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

DANIEL D. SEWALL.  
Witnesses: JAMES H. SEWALL.  
JOSIAH H. DRUMMOND,  
CHARLES L. DRUMMOND.