907,033.

E. H. GOLD.

HEATING SYSTEM.

APPLICATION FILED JULY 31, 1908.

Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.

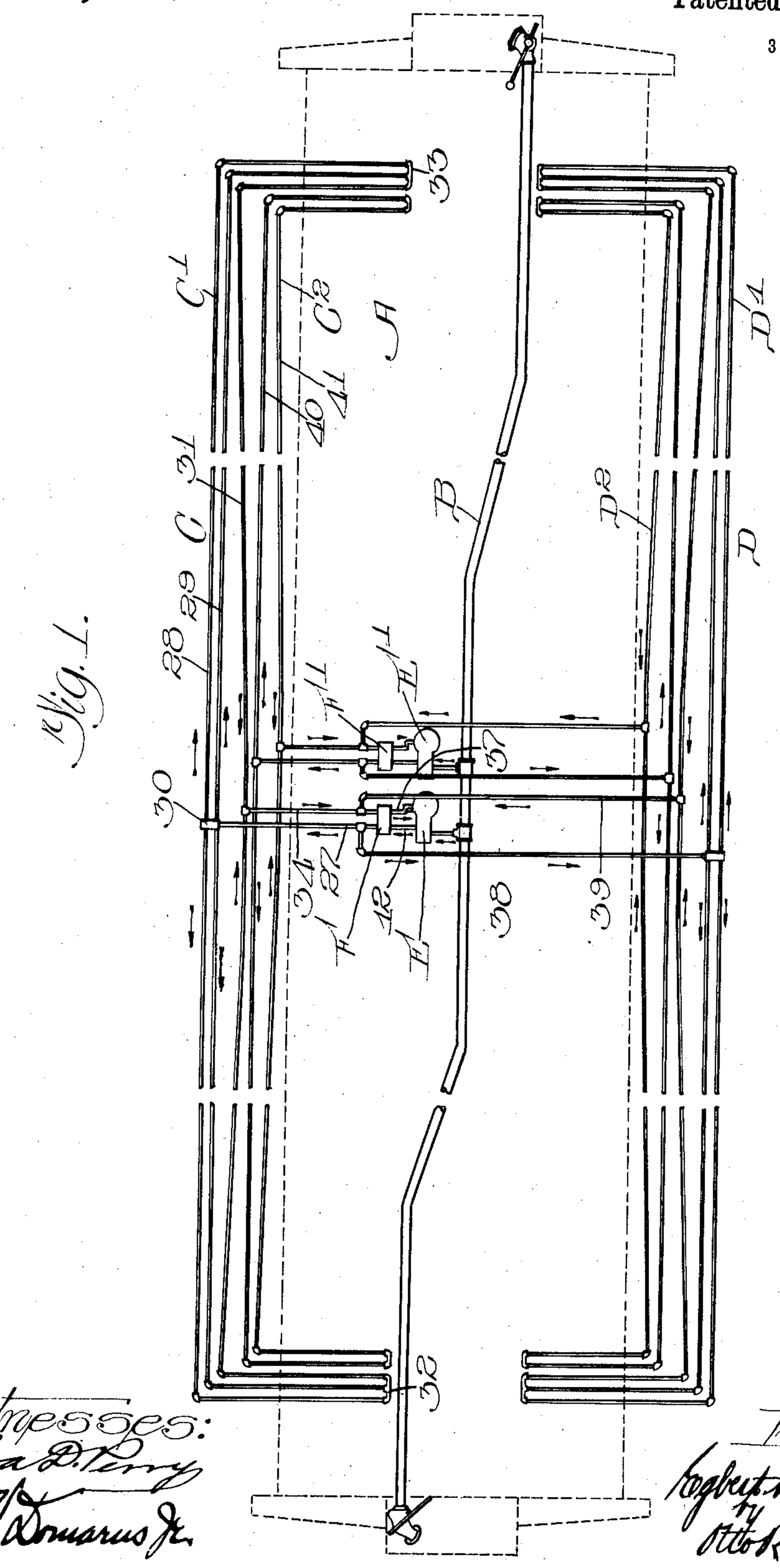


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

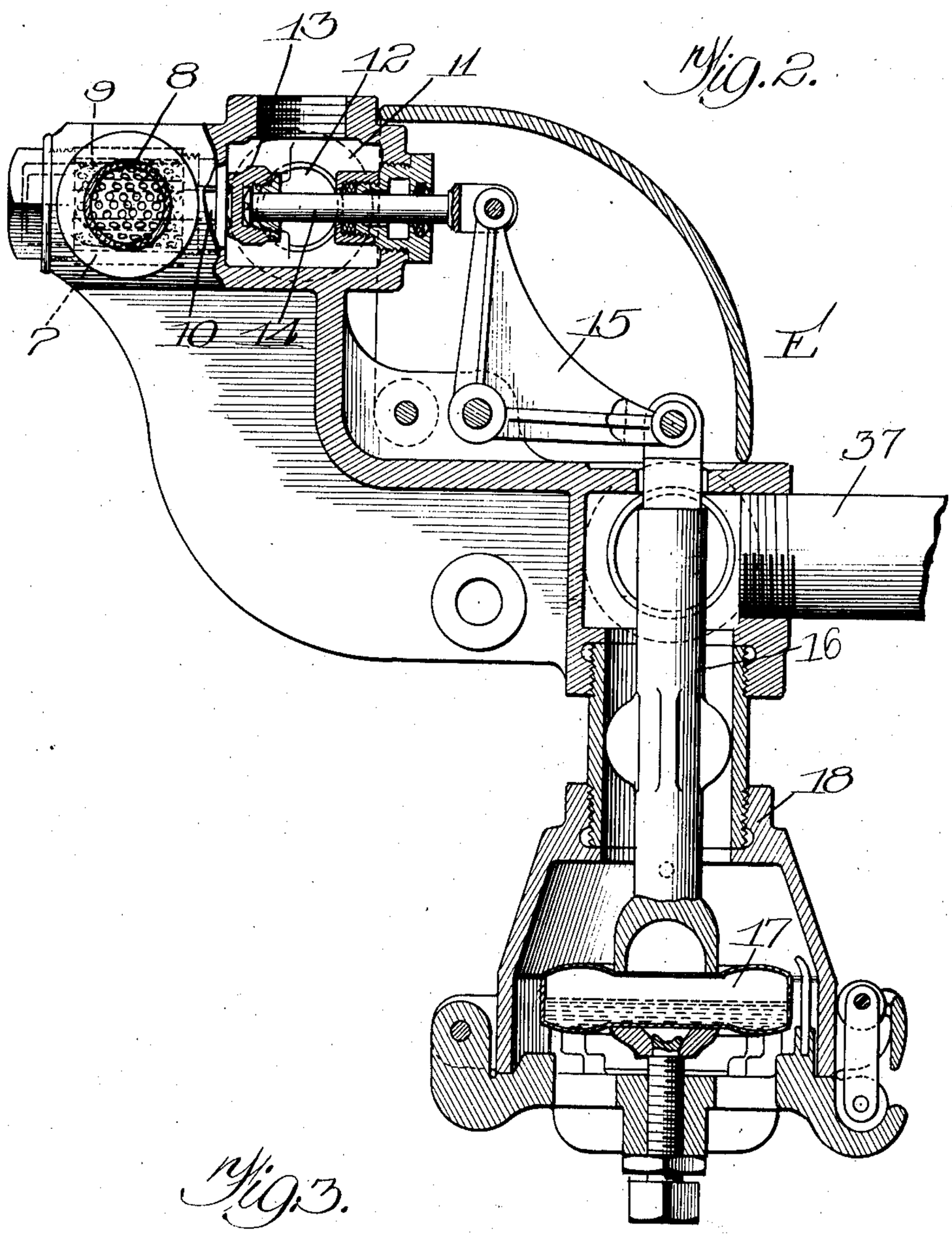
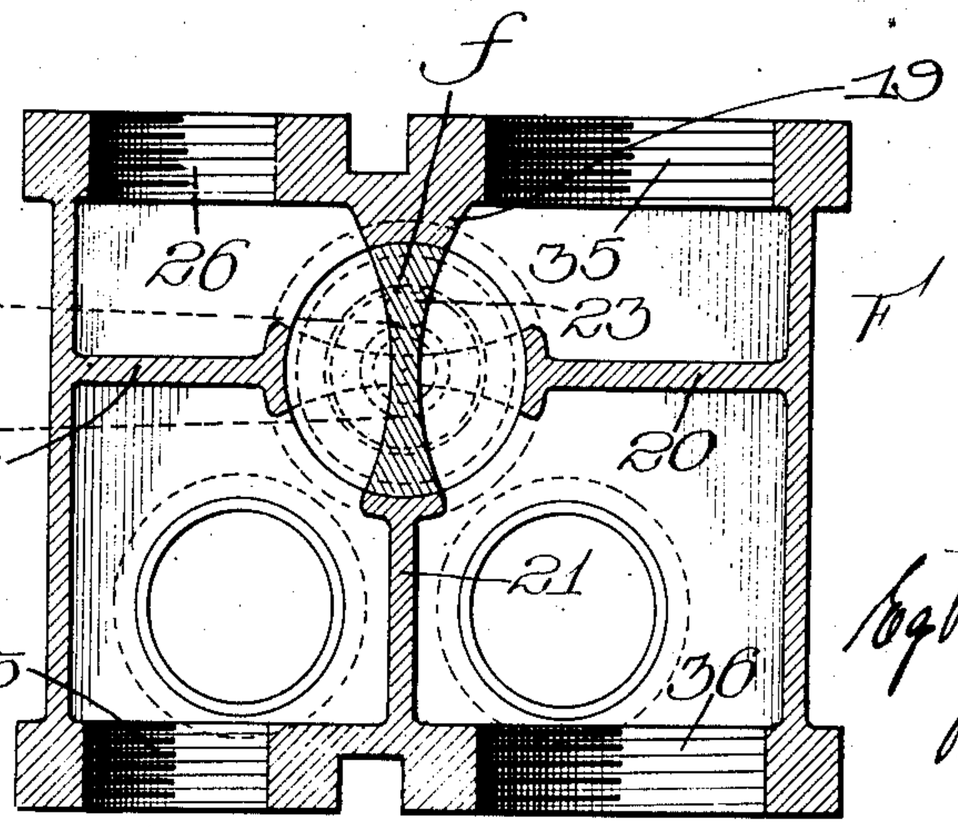



Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 1.

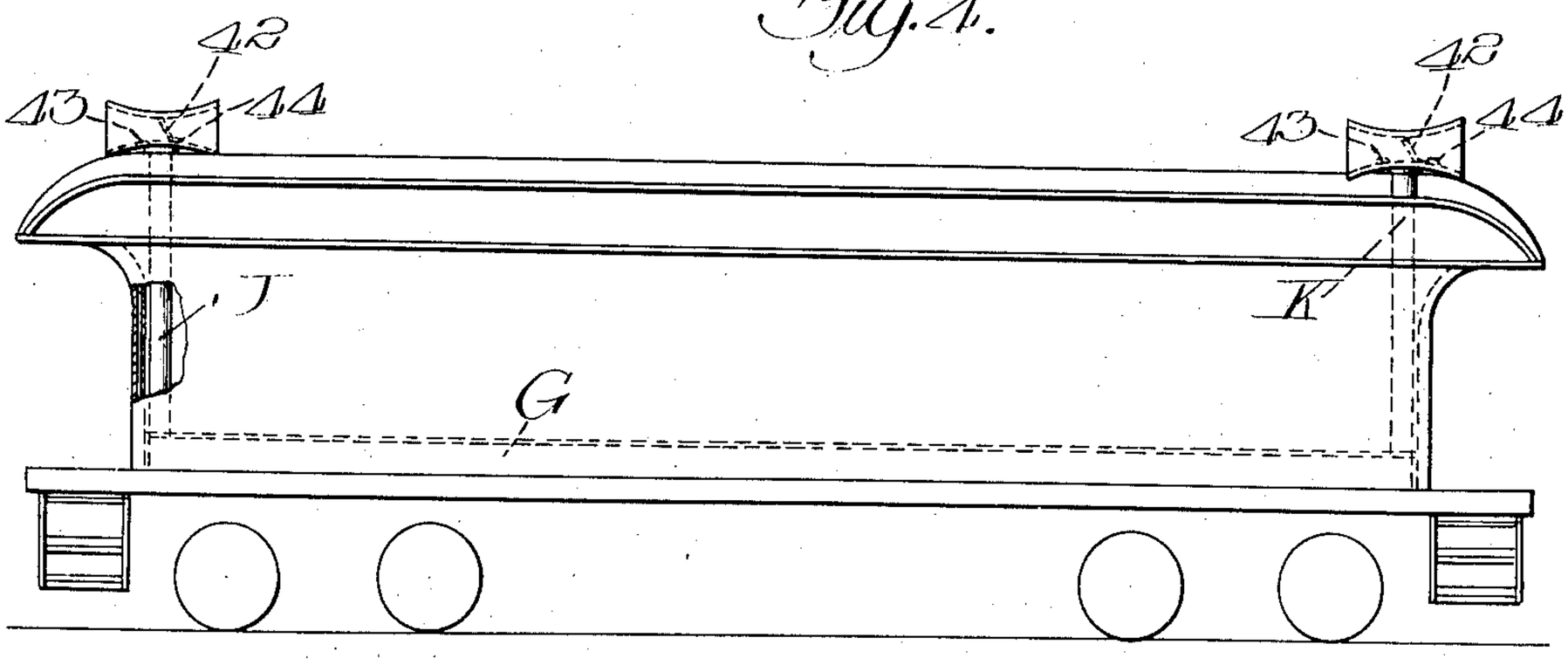



Fig. 5.

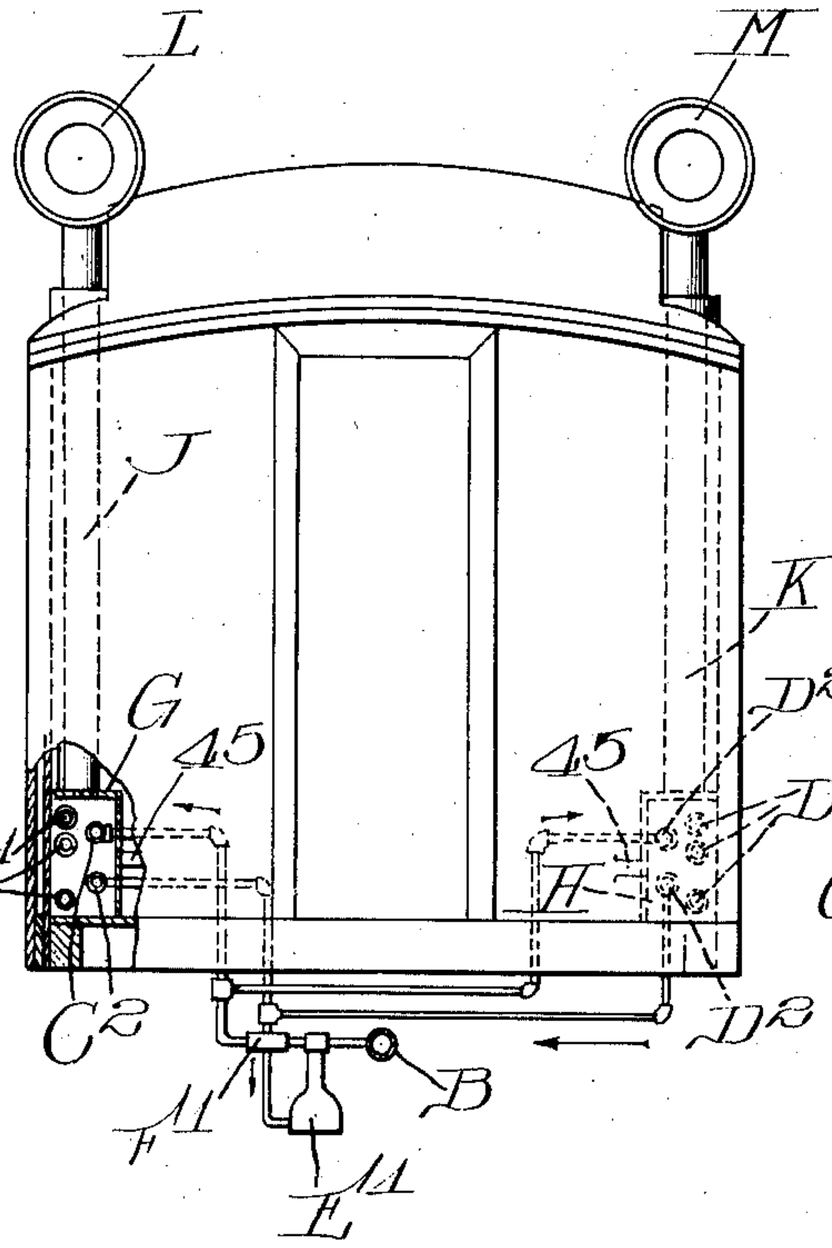
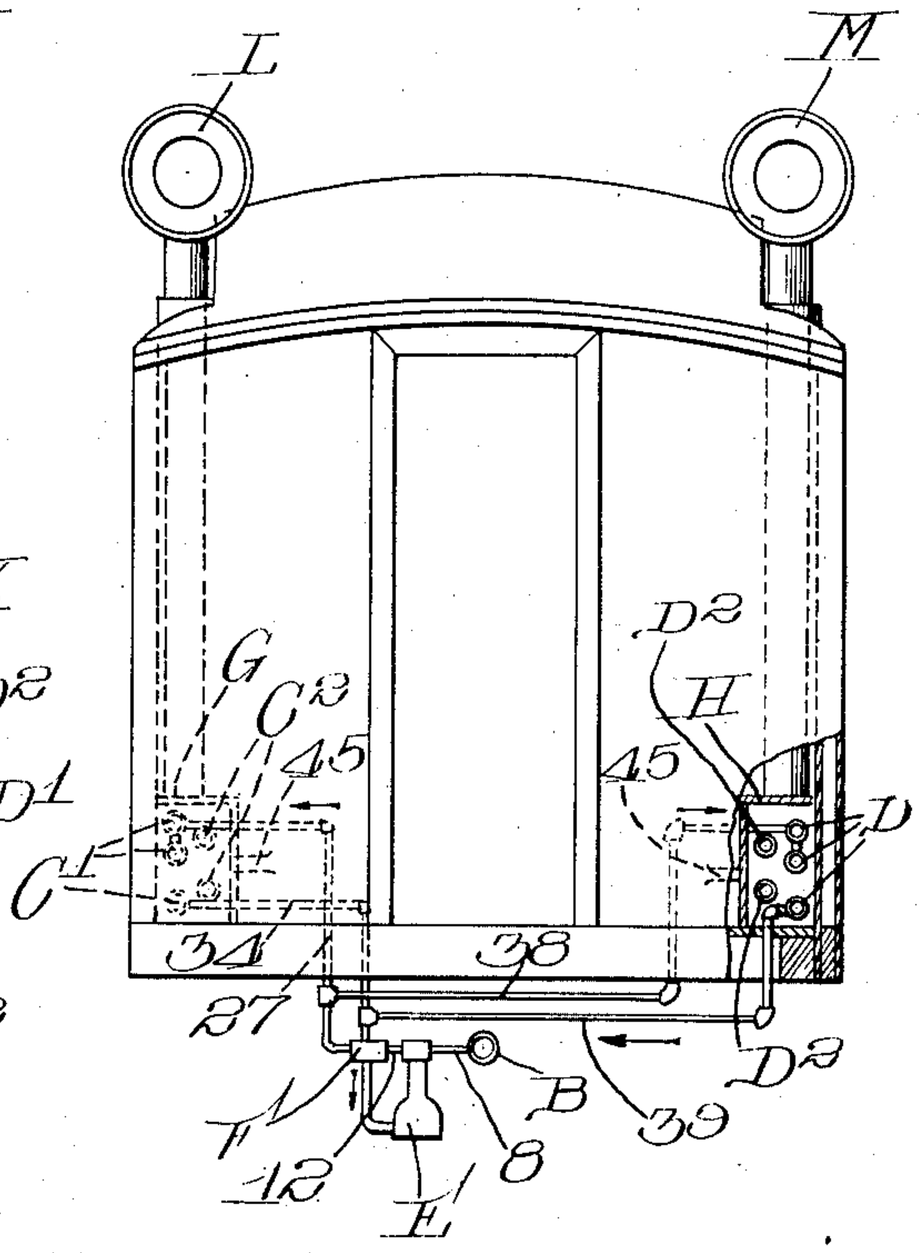



Fig. 6.

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# UNITED STATES PATENT OFFICE.

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## HEATING SYSTEM.

No. 907,033. Specification of Letters Patent. Patented Dec. 15, 1908.

Application filed July 31, 1908. Serial No. 446,259.

*To all whom it may concern:*

Be it known that I, EGBERT H. GOLD, 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 Heating Systems, of which the following is a specification.

My invention relates to a heating system for railway cars and has for its object to provide new and improved arrangements whereby railway cars may be more effectively and uniformly heated, and, if desired, at the same time ventilated, and whereby the supply of the heating medium to the radiators may be varied at will, determinately and uniformly throughout the car.

It is customary to provide railway cars with two radiators or coils of piping, one on each side of the car, and to supply each of these radiators with the heating medium separately through separate controllers or valves. If a car, so provided with heating coils, becomes overheated, the attendant naturally and ordinarily shuts off the steam from one side of the car, thus reducing the supply of medium one-half. The result, however, is that one side of the car is overheated while the other side is too cold. This is particularly unpleasant, as the radiating pipes are located under and in proximity to the seats. Moreover, drafts are produced through the car. These evils are perhaps specially objectionable and accentuated when the flow of steam through the radiating coils is controlled by automatic controllers; for, if a sudden fall of temperature occurs, with the radiator on one side of the car cut out, the automatic devices controlling the flow of the medium through the other radiator will respond to the fall in temperature, causing an increase of heat on that side of the car sufficient, within certain limits, to make up for the inactivity of the other radiator. As a result, the car is unevenly heated without, perhaps, changing the average temperature in the car. The attendant, who is likely to be moving about the car, does not notice this condition, being satisfied if the proper mean temperature is obtained.

It is one of the objects of my invention to provide a heating system by means of which the supply of steam from the train pipe to the radiators on opposite sides of the car may be varied determinately, so that greater or less amounts of heat may be supplied to the radiators at will and in which the variation shall be uniform for both sides of the car, thus obviating the excessive overheating of any particular part of the car.

My invention has for a further object to provide a combined system of heating and ventilating in which cold air from the outside of the car is drawn into the car, heated by contact with radiating pipes, and then circulated through the car. In such a system obviously uniformity of supply of heat to both sides of the car is essential and all of the evils attending lack of uniformity, as mentioned above, would be accentuated to a high degree. If, for example, the heat were entirely or largely shut off from one side of the car, the cold air drawn into the air trunks around the radiating pipes on that side would not be heated at all, or at least not properly heated, and thus cold air would be forced into the car from one side and hot air from the other side, thus producing very great unevenness of temperature and dangerous and unpleasant drafts.

My invention contemplates providing a system for ventilating and heating a car which shall operate uniformly.

The invention has for further objects such other new and improved constructions and arrangements in car heating systems as will be described in the following specification and specifically set out in the claims appended thereto.

The invention is shown and will be described as an improvement upon the system of car heating known as the vapor system, because, as suggested, the improvements of the present invention are particularly useful in connection with such a system of heating. They might be advantageously employed in other systems of heating.

The invention is illustrated, in a typical embodiment, in the accompanying drawings, in which—

Figure 1 is a plan view of a railway car showing somewhat diagrammatically the arrangement of the radiating pipes, valves and controllers in accordance with my invention. Fig. 2 is a vertical section through a well known form of vapor regulator suitable for use in the heating system of this invention. Fig. 3 is a longitudinal section through a vapor cut out valve. Fig. 4 is a side elevation of a car provided with air trunks and intakes. Fig. 5 is an end view of a car showing the connection to one set of coils on opposite sides of the car; and Fig. 6 is a similar view, omitting

the aforesaid connections and showing the other set.

Like characters of reference indicate like parts in the several figures of the drawings.

A represents the flooring of a car, B the train pipe, which, it will be understood, runs the length of the train and ordinarily carries a supply of steam at locomotive pressure.

C represents the radiator at one side of a car, which consists preferably of two separate coils C′ C². On the other side of a car is a radiator D comprising corresponding coils D′ D². Coils C′ D′ are supplied with steam from train pipe B through a common vapor regulator E and a common vapor cut out valve F. Likewise coils C² D² are supplied through the vapor regulator E′ and cut out valve F′.

A suitable form of vapor regulator is shown in Fig. 2. This is the form of device illustrated in my co-pending application Serial No. 426,718. It is chosen simply for purposes of illustration. Another form of automatic controlling device might be substituted. In this device steam from the train pipe enters chamber 7 of the controller through pipe 8, passes through the strainer 9 and through port 10, into valve chamber 11, whence it passes out of the controller through pipe 12 to the cut out valve F. Port 10 is controlled by valve 13 on the rod 14, pivoted to bell crank 15, to which, in turn, is pivoted the operating rod 16 of the thermostatic member 17, these parts being inclosed in a casing 18 into which is tapped a pipe 37 leading from the discharge side of the vapor cut out valve, which is connected with the discharge ends of coils C′, D′. Valve 13 remains open until steam is forced out through the discharge ends of coils C′ D′, in which event thermostat 17 expands and closes the valve, shutting off the supply of steam to the coils. Valve 13 remains closed until the thermostat has contracted, whereupon the valve is again opened. As is well known in this art, valve 13 will not ordinarily be either opened or closed fully, but will remain in such position as to admit a sufficient amount of steam to the coils to keep them filled with steam at substantially atmospheric pressure.

Vapor cut out valve F is shown in Fig. 3. It consists of a casing provided with the webs 19, 20, 21 and 22, with which coöperates a rotating valve-piece 23, operated by handle 24. The steam enters port 25 from the controller, and, when the valve is in the position shown in full lines, passes out through port 26 into a pipe 27, which is connected with the two outer pipes 28, 29 of coil C′ by the double T 30, or other suitable means. Pipes 28 and 29 are connected with the inner or return pipe 31 of coil C′ by means of the headers 32, 33 and a pipe 34 leads from approximately the center of pipe 31 to port 35 of the vapor cut out, whence the water of condensation or steam, as the case may be, passes, by means of port 36, into pipe 37, which leads into the casing surrounding the thermostat member of controller E. A branch pipe 38 leads from pipe 27 to coil D′, which, being in all respects like coil C′, will not be further described, a branch pipe 39 leading from this coil back to pipe 34 and into the discharge side of the vapor cut out E. The casing of the cut out may be perforated at *f* to form a waste port for water when the valve is closed. This port is covered by the valve when in its open position.

When the valve 23 is turned into the position shown by the dotted lines in Fig. 3, ports 25, 26 and 35, 36, respectively, will be cut out of communication and communication will be opened between ports 25 and 36. Steam will now be cut off from coils C′, D′ and will pass from the inlet end of the vapor regulator to its thermostat chamber, thus keeping the vapor regulator active and preventing it from freezing up. As the steam is at reduced pressure when it reaches the vapor cut out, the valve 23 does not have to be packed, as would be necessary if the cut out were to operate on steam at locomotive pressure.

Coils C², D² are similarly supplied with steam through vapor regulator E′ and cut out valve F′. It is not necessary to describe these devices, as they are in all respects like devices E and F. Coils C², D² are preferably of greater or smaller volumetric contents than the other pair of coils. They are shown as consisting of two pipes 40 and 41, instead of the three pipes of the other coils. They are connected up with their common vapor regulator and cut off in the same manner as coils C′, D′. By this arrangement it will be seen that the amounts of steam supplied to heat the opposite sides of a car may be varied determinately and that such variation will always, and necessarily, be uniform for both sides of a car. In the arrangement shown, 40%, 60% or 100% of the capacity of the coils may be supplied at will. The uniformity of supply to opposite sides of the car is assured and fixed. It is not left to the discretion or judgment of the attendant. If a supply of 40% is required, the steam will be entirely shut off from coils C′, D′, this being done by simply turning handle 24 of valve 23 so as to turn the valve into the position shown in the dotted lines in Fig. 3. The corresponding valve of cut out F′ will be open. If a supply of 60% is desired, the valve of F′ will be closed and the valve of F opened. If a full supply is needed, both valves will be opened and both sets of coils put into operation. Obviously the number of coils in each set of radiating pipes may be increased or the proportion between the volumetric contents varied. When the corresponding pairs of

coils on opposite sides of the car are controlled by an automatic controlling device and by a common automatic controlling device, as is shown, if more steam is required to heat one side of the car than the other, as may happen when a cold wind is blowing against one side of the car, the apportionment between the steam actually passing through the radiator on opposite sides of the car is effected automatically. The condensation in the radiating pipes on the cold side of the car will be more rapid than on the other side of the car and consequently a greater proportion of the supply will enter the pipes upon that side.

In Figs. 4 to 6 inclusive I have shown a combined system of heating and ventilation involving the improvements in the arrangement of the coils and their controlling devices above described. In this arrangement the radiators C and D on opposite sides of the car are inclosed in air trunks G, H, respectively, to which lead the air supply pipes J and K, which extend through the roof of the car and are provided with hoods L and M. Preferably the pipes J and K are at opposite ends and opposite sides of the car. They will be preferably provided with suitable valves or deflectors. As shown, the hoods have the swinging valves 42, which abut against shoulders 43 or 44, according to the direction in which the car is traveling. The air trunks are provided at intervals with discharges 45.

Cold air from the outside of the car will be drawn into the trunks on each side of the car through pipes J and K and will become heated by contact with the steam coils in the trunks and finally discharge through the outlets 45. Supposing both sets of coils to be in operation, if the temperature of the car rises above the normal, one set or the other may be cut out by operating the valve of cut out F or F'. The air entering from opposite sides of the car will continue to be uniformly heated, though to a less degree. So far as the uniformity of the heating is concerned, nothing is left to the judgment or discretion of the attendant. As the air issuing from both the trunks is heated to a uniform degree, there is no danger of drafts or cold blasts being produced.

I do not limit myself to the particular devices, constructions and arrangements shown, as modifications could be devised which would come within the spirit of my invention. It would, of course, be possible to construct the radiators on opposite sides of the car of different capacity. In such case, the amounts of heating medium received by the two radiators and the amounts of heat produced by the same would not be absolutely uniform, but only relatively so.

I claim:

1. The combination with a railway car, of a source of supply of heating fluid, air trunks located within the car on either side thereof, separate radiators in said trunks, each radiator comprising separate coils, which separate coils receive heating fluid from the source of supply independently of each other, means for introducing air from outside the car into said trunks, said trunks being provided with outlets into the car, a supply pipe for supplying heating medium to said radiators, and hand operated controlling means common to said radiators for controlling the admission of heating fluid from the source of supply to the corresponding coils of each radiator.

2. The combination with a railway car, of a source of supply of heating fluid, air trunks located within the car on either side thereof, separate radiators in said trunks, each comprising separate coils of different capacity but corresponding in both radiators, which separate coils receive heating fluid from the source of supply independently of each other, means for introducing air from outside the car into the trunks, the trunks being provided with outlets into the car, a supply pipe for supplying heating medium to the radiators, and hand operated controlling means common to said radiators for controlling the admission of heating fluid from the source of supply to the corresponding coils of each radiator.

3. The combination with a railway car, of a source of supply of heating fluid, air trunks located within the car on either side thereof, separate radiators in said trunks each comprising separate coils, which separate coils receive heating fluid from the source of supply independently of each other, means for introducing air from the outside of the car into the trunks, the trunks being provided with outlets into the car and vapor regulators, and hand operated devices common to said radiators for controlling the admission of heating fluid from the source of supply to the corresponding coils of each radiator.

4. The combination with a railway car, of a source of supply of heating fluid, air trunks within the car on either side thereof, separate radiators in said trunks each comprising separate coils, which separate coils receive heating fluid from the source of supply independently of each other, means for introducing air from outside of the car into the trunks, the trunks being provided with outlets into the car, a supply pipe for supplying heating medium to the radiators, a vapor regulator common to said radiators for the corresponding coils on opposite sides of the car which receives the heating medium from the supply pipe, a hand operated device connected with each of said vapor regulators, and pipes leading from said hand operated device to said corresponding coils on opposite sides of the car.

5. The combination with a railway car, of

a source of supply of heating fluid, radiators on opposite sides of said car, each radiator comprising separate coils, which separate coils receive heating medium from the source of supply independently of each other, a supply pipe for supplying heating medium to said radiators, and hand operated devices common to said radiators for controlling the flow of the heating medium to corresponding coils on opposite sides of the car.

6. The combination with a railway car, of a source of supply of heating fluid, radiators on opposite sides of said car, each radiator comprising separate coils, which separate coils receive heating medium from the source of supply independently of each other, and vapor regulators and hand operated devices common to said radiators for controlling the flow of heating medium to corresponding coils on opposite sides of the car.

7. In a car heating system, the combination with a supply pipe, of separate radiators located in and arranged to heat different parts of the car, each radiator comprising separate coils, connections from the supply pipe to said coils whereby said separate coils of each radiator are supplied with heating medium from the supply pipe independently of each other, and hand operated controlling means common to corresponding coils of said radiators to control the admission of heating medium from the supply pipe to said corresponding coils.

8. In a car heating system, the combination with a supply pipe, of separate radiators located in and arranged to heat different parts of the car, each of said radiators comprising separate coils of different capacities but corresponding in the different radiators, connections from the supply pipe to said coils whereby said separate coils of each radiator are supplied with heating medium from the supply pipe independently of each other, and hand operated controlling means common to corresponding coils of said radiators to control the admission of heating medium from the supply pipe to said corresponding coils.

9. In a car heating system, the combination with a supply pipe, of separate radiators located in and arranged to heat different parts of the car, each radiator comprising separate coils, connections from the supply pipe to said coils whereby said separate coils of each radiator are supplied with heating medium from the supply pipe independently of each other, hand operated controlling means in said connections common to corresponding coils of said radiators, and automatic controlling means for controlling the flow of heating medium to said radiators in accordance with thermostatic conditions at the discharge ends of said radiators.

10. In a car heating system, the combination with a supply pipe, of separate radiators located in and arranged to heat different parts of the car, each of said radiators comprising separate coils, connections from the supply pipe to said coils whereby said separate coils of each radiator are supplied with heating medium from the supply pipe independently of each other, hand operated controlling means in said connections common to the corresponding coils of said radiators, and automatic controlling means for said corresponding coils to control the admission of heating medium from the supply pipe to said corresponding coils, said means being located between the supply pipe and said hand operated controlling means.

11. In a car heating system, the combination with a supply pipe, of a radiator on each side of the car, said radiators comprising separate coils, a vapor regulator receiving steam from the supply pipe, a vapor cut out valve connected with the vapor regulator, pipes from the vapor cut out device to one coil on each side of the car, and a second vapor regulator and vapor cut out device similarly arranged and connected with another pair of coils on opposite sides of the car.

12. The combination with a car, of a source of supply of heating fluid, radiators located in different parts of the car, each radiator comprising separate radiating elements arranged to independently receive the heating medium from said source of supply, and means common to said radiators for directing the flow of the heating medium to corresponding radiating elements in said radiators.

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