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Patented July 13, 1909.

28 SHEETS—SHEET 1.



Witnesses:
Radney
Wm J. Lued.

Inventor:
 Egbert H Good
 by W R Barnet
 Atty.

E. H. GOLD.
HEATING SYSTEM.
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928,041.

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2 SHEETS—SHEET 2.

Fig. 2.

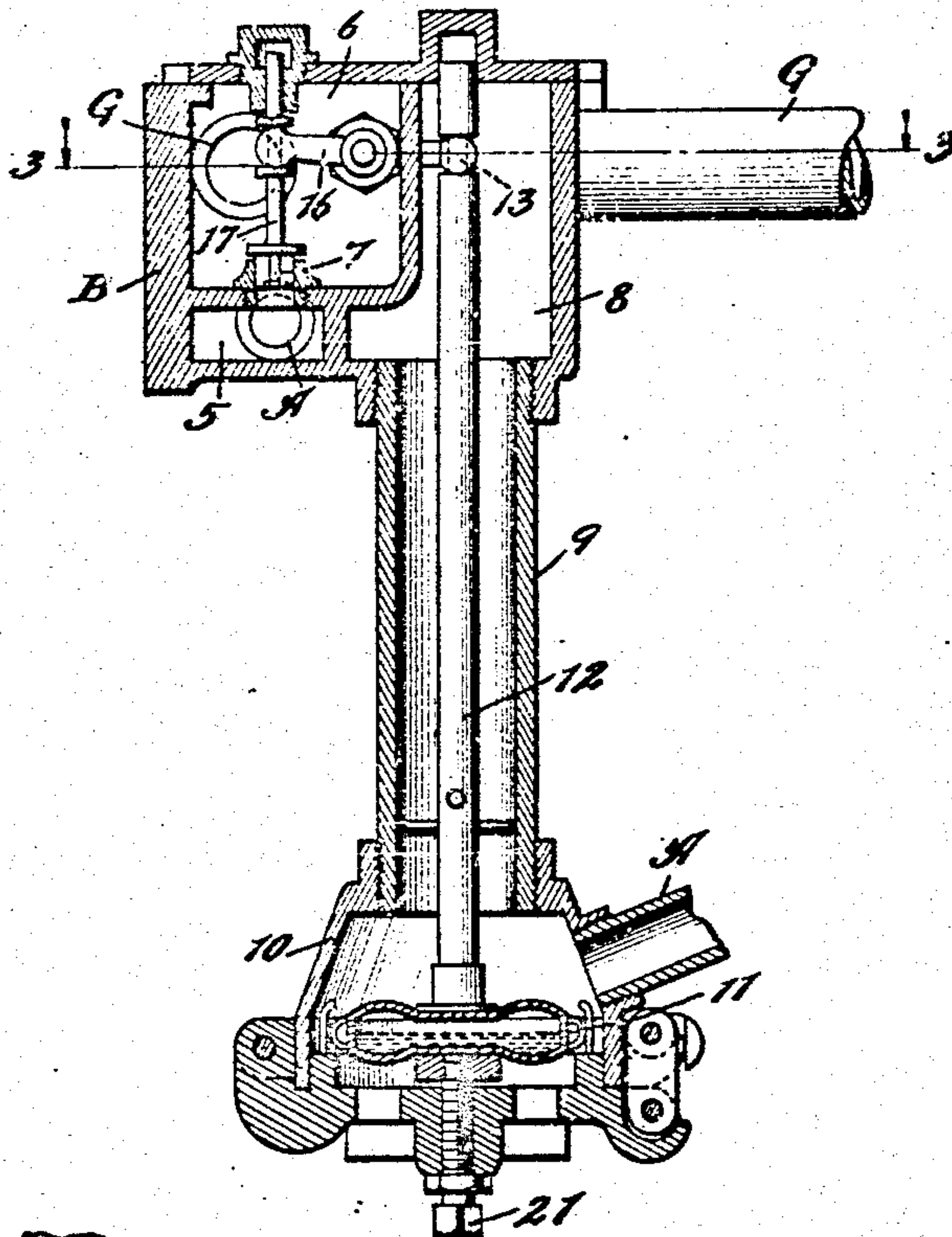
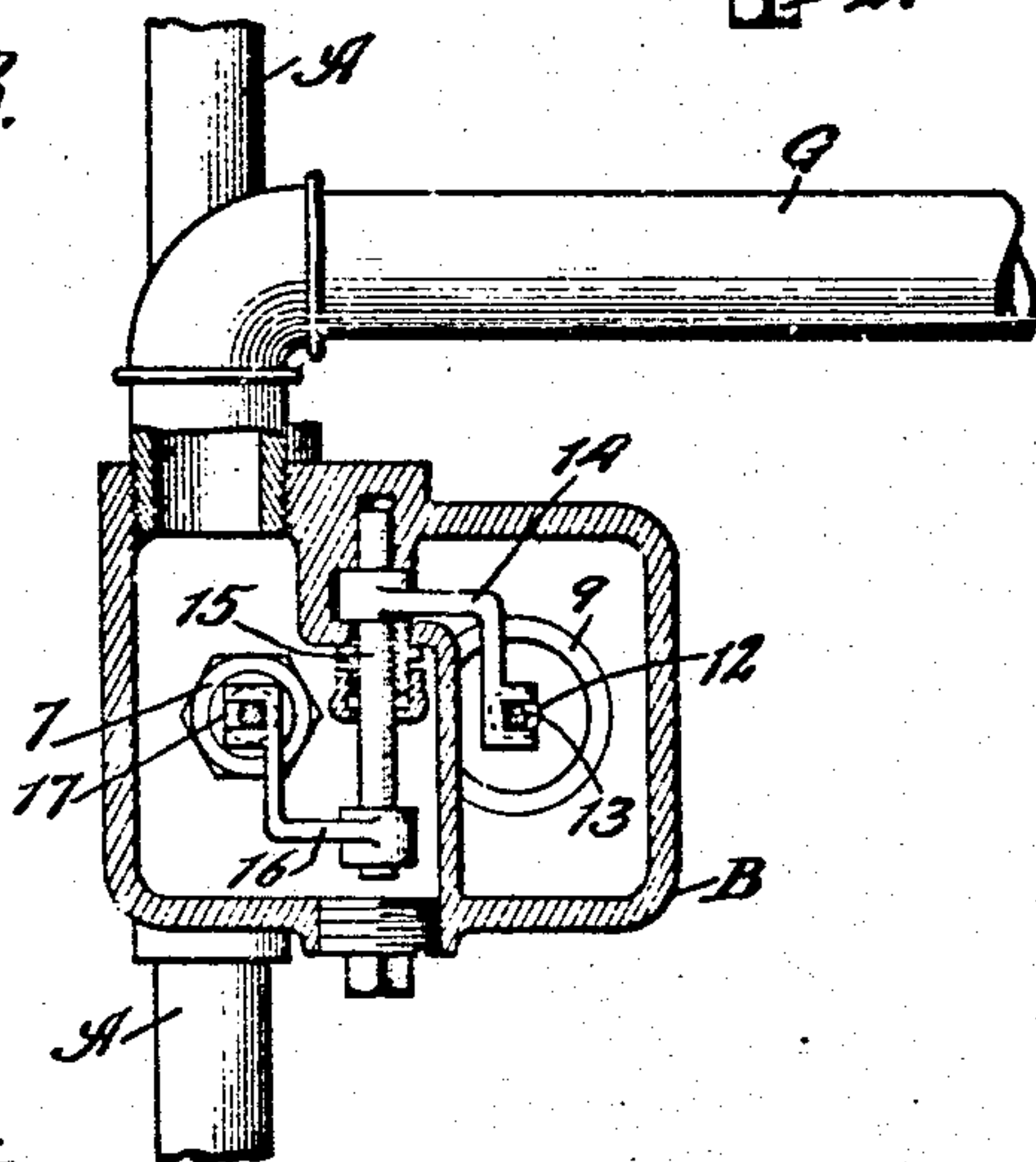


Fig. 3.



Witnesses:
Edw. H. Gold
Chas. J. Lueders

Inventor:
Edw. H. Gold
Wm. J. Lueders
Atty.

UNITED STATES PATENT OFFICE.

EGBERT H. GOLD, OF CHICAGO, ILLINOIS.

HEATING SYSTEM.

No. 928,041.

Specification of Letters Patent.

Patented July 13, 1909.

Original application filed February 5, 1906, Serial No. 299,529. Divided and this application filed April 9, 1909. Serial No. 488,801.

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.

The invention relates to a heating system particularly adapted for railway cars in which steam is taken from a source of high pressure, which, however, may be variable, as is the pressure in the train pipe in car heating systems, and circulated at a lower uniform pressure through suitable coils or other radiating devices.

One of the principal objects of the invention is to control by a single controller a plurality of coils or radiators in such a way that one or more of such radiators may be closed without interfering with the maintenance of the desired conditions in the remaining radiators.

A further object of the invention is to provide means for keeping the thermostat at a non-freezing temperature, regardless of whether said radiators are open or closed.

I accomplish these purposes by interposing between the source of supply and the radiator or radiators a controlling device comprising an inlet valve and a thermostatic member for operating the same and providing also a conduit which leads from the low pressure side of the inlet valve into proximity with the thermostatic member of the controller, this conduit having a valve which can be set to regulate the flow of fluid there-through.

The present application relates particularly to an arrangement in which the conduit referred to has no effective heating function and to an arrangement in which such conduit, whether it has this function or not, is interposed between the common supply pipe of a plurality of radiators and the thermostatic member of a single controlling device which controls the flow of heating fluid to said radiators. The broader features of the invention herein disclosed are claimed in my co-pending application, Serial No. 299,529, filed February 5, 1906, this application being a division of such prior application.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a perspective view of one form of heating system suitable for carrying out

the invention. Fig. 2 a vertical section through the controlling device, and Fig. 3 a sectional plan on line 3—3 of Fig. 2.

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

Referring to the drawings, A represents the train pipe or other source of supply of steam at high pressure.

The controlling device is represented generally by the letter B.

C, D, E and F are radiating coils which preferably discharge freely to the atmosphere and may be of different lengths as shown. The coils might, of course, be of the same length.

G is a common supply pipe which supplies all of the radiators with steam taken from the train pipe A and maintained at a uniform lower pressure by the agency of the controlling device to be described hereinafter.

H is a conduit or loop which leads from pipe G to the thermostat chamber of controller B.

Any desired form of thermostatic controller may be employed for controlling the inflow from train pipe A in accordance with thermostatic conditions at the discharge end of loop H. I have shown a suitable form of controller in Figs. 2 and 3. This device comprises a casing which is divided so as to form a high pressure chamber 5 with which the train pipe A communicates, and a low pressure chamber 6 between which is a port controlled by a valve 7; and a chamber 8. In the bottom of the casing is tapped a pipe 9 to which is screwed a casing 10 in which is located a thermostatic member 11 consisting of a receptacle containing a volatile fluid. Resting on the thermostatic member is a rod 12, the reduced portion of which 13 engages with a lever 14 on a rock shaft 15, carrying a lever 16 which similarly engages with the stem 17 of valve 7. The rock shaft may pass through a suitable stuffing box 18 as shown. The loop H terminates in the thermostatic casing 10. The pipe G leads from the low pressure chamber 6. This pipe is preferably provided with a valve 19. The loop H is also preferably provided with some suitable form of valve which may be set so as to determine the amount of steam which shall escape through the loop to the thermostat casing. I have shown this valve as an ordinary manually operated globe valve.

Any other sort of valve might be employed. The thermostat has the usual adjusting screw 21.

The separate radiators are preferably provided with the restricting valves 22 which may be adjusted as required. The radiators may also have the manually operated valves 23 by means of which they may be closed against the inflow of steam.

10 The operation of the heating system described is as follows: The steam from train pipe A flows into low pressure chamber 5 and thence past valve 7, supposing this valve to be open, and into supply pipe G. Supposing valve 19 to be open the steam will pass 15 from pipe G into such of the radiators as are open in amounts determined by the relative positions of valves 22, which valves are ordinarily set so as to maintain the desired amount of steam for the particular radiator. Preferably, these radiators are open to the atmosphere at their discharge ends so that the pressure in them does not rise above atmospheric pressure. The volume of steam 25 in the radiators will obviously depend upon the position of valves 22. The steam from supply pipe G will also pass through loop H to the thermostat and if in sufficient volume, will act upon the thermostat to cause the closing or throttling of valve 7. The amount of steam passing to the thermostat may be determined by a proper setting of valve 20. It will be seen, therefore, that the controlling means is of such a character as to accommo- 35 date itself automatically to variations in the amount of radiating surface under steam. If one of the radiators is closed, this causes a rise in pressure in the supply pipe and consequently a rise in pressure in loop H resulting in a shutting down of valve 7. The pressure in the common supply pipe G is consequently automatically adjusted so that there is no excess in the remaining radiators, and consequently no loss of steam. 45 If valve 19 be closed or if all the separate valves 23 be closed, valve 19 being merely for convenience in shutting off the whole system, there will still enough steam pass to the thermostat to keep it at a non-freezing 50 temperature in cold weather.

It will be understood that the various valves will be set so as to adjust the system to any particular requirements.

I do not limit myself to the particular 55 devices, constructions and arrangements shown, as modifications might be devised which would come within the invention, as defined by the claims. I do not, however, claim the inventions claimed in my prior application referred to above, intending in 60 the present application to claim such inventions specific to the arrangements here shown which are not claimed in the prior application.

65 I claim:

1. The combination with a plurality of systems of radiating pipes constantly open to the atmosphere, of a device for controlling the flow of a heating fluid to said pipes, said device comprising a valve and a valve actuating thermostat, a fluid conduit arranged to receive the heating fluid after it has passed the inlet side of said controlling device and to conduct said fluid to the thermostatic member of said controlling device, said conduit affording a circuit for the heating fluid other than that provided by any of said systems of radiating pipes, all so arranged that the controlling device will be influenced and caused to operate by the thermostatic condition of the heating fluid in said conduit, each of said systems of radiating pipes being provided with adjustable means controlling the supply of the heating fluid thereto, whereby the flow of heating fluid to each of said systems of radiating pipes may be equalized and proportioned with relation to the fluid pressure in said conduit, so that each of said systems will be substantially filled with steam to the outlets of said systems, respectively, but without substantial waste of steam therefrom.

2. The combination with a source of high pressure supply, of a plurality of pipe systems, a thermostatic supply controlling device interposed between said source of supply and said pipe systems, comprising a loop leading from the outlet side of said controlling device to its thermostatic member, and adjustable means interposed in the path of the steam between said control device and one of said pipe systems to insure a proportionate flow of steam to all of said pipe systems.

3. The combination with means for supplying a heating medium at a relatively high pressure, of a radiator and a thermostatic pressure reducing device arranged to reduce the pressure of the heating medium supplied from said high pressure supply to said radiator, said pressure reducing device comprising a valve, a thermostat arranged to actuate said valve and a conduit in communication at one end with the steam supply between the radiator and said valve, and at the other end with said thermostat and provided with an independent discharge port, said conduit having no effective heating function.

4. In a car heating apparatus, the combination with a train pipe arranged to supply steam at relatively high pressure, a plurality of radiators arranged in a car and arranged to be supplied with steam from the train pipe, separate supply valves arranged to independently control the inflow of steam to their respective radiators and a thermostatically actuated pressure-reducing apparatus comprising an automatic regulating device and a controlling valve interposed between the train pipe and the radiators, said auto-

matic device and control valve being arranged in circuit with each other, but not in circuit with the radiators, whereby steam from the train pipe will pass through the inlet end of the automatic device thence through a conduit to said control valve and through said control valve to the thermostatic member of said automatic device, whereby the expansion of said thermostatic member will control the inflow of steam from said train pipe.

5. The combination with a plurality of radiating systems of unequal radiating surfaces and in constant communication with the atmosphere, of a source of high pressure steam supply, a controlling device interposed between the source of supply and said radiating systems to control the flow of steam thereto, said device comprising a thermostatically operated valve and a loop arranged to conduct steam from the outlet side of said valve to its thermostatic member, and adjustable means interposed between said controlling device and said radiating systems to provide a variable flow of steam to said radiating systems.

6. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe having an inlet valve between the source of supply and the radiators, a thermostat to operate said valve and a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat said conduit being provided with an independent discharge port, all so arranged that steam is continuously supplied to said conduit whenever it is supplied to any of said radiators.

7. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe having an inlet valve between the source of supply and the radiators, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, and a valve in said conduit which may be set so as to vary the flow to said thermostat.

8. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe having an inlet valve between the source of supply and the radiators, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, said radiators having discharges open to the atmosphere at points remote from said thermostat.

9. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe having an inlet valve

between the source of supply and the radiators, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, said radiators having discharges open to the atmosphere at points remote from said thermostat, each of said radiators provided with a valve which may be set to regulate the volume of fluid admitted thereto.

10. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe between said source of supply and said radiators provided with an inlet valve, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, a valve in said conduit which operates to regulate the flow of fluid to the thermostat, said radiators having discharges open to the atmosphere at points remote from said thermostat, and a valve for each of said radiators to regulate the inflow thereto.

11. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe between said source of supply and said radiators, provided with an inlet valve, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, a valve in said conduit which operates to regulate the flow of fluid to the thermostat, said radiators having discharges open to the atmosphere at points remote from said thermostat, a valve for each of said radiators to regulate the inflow thereto, said radiators consisting of coils of different lengths.

12. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a plurality of radiators, a common supply pipe having an inlet valve between the source of supply and the radiators, a thermostat to operate said valve, a conduit leading from said supply pipe on the low pressure side of said inlet valve into proximity with said thermostat, said radiators comprising coils of different lengths all so arranged that steam is continuously supplied to said conduit whenever it is supplied to any of said radiators.

13. In a heating system, the combination with a source of supply of heating fluid at high pressure, of a radiator connected thereto, an inlet valve to control the flow of heating fluid from the source of supply to the radiator, a thermostat to operate said valve, and a controlling loop leading from the low pressure side of said valve into proximity with said thermostat and provided with an independent discharge port, which loop has no effective heating function, all to

arranged that steam is continuously supplied to said loop whenever it is supplied to said radiator.

14. In a heating system the combination with a source of supply of heating fluid at high pressure, of a radiator connected therewith, an inlet valve to control the flow of heating fluid from the source of supply to the radiator, a thermostat to operate said valve, a controlling loop leading from the low pressure side of said valve into proximity with said thermostat which loop has no effective heating function, and a valve in said loop to regulate the flow of fluid to said thermostat.

15. In a heating system the combination with a source of supply of heating fluid at high pressure, of a radiator connected therewith, an inlet valve to control the flow of heating fluid from the source of supply to the radiator, a thermostat to operate said valve, a controlling loop leading from the low pressure side of said valve into proximity with said thermostat, which loop has no effective heating function, a valve in said loop to regulate the flow of fluid to said thermostat, said radiator having a discharge outlet which is open to the atmosphere at a point remote from said thermostat.

16. In a heating system the combination with a source of supply of heating fluid at high pressure, of a radiator connected therewith, an inlet valve to control the flow of heating fluid from the source of supply to the radiator, a thermostat to operate said valve, a controlling loop leading from the low pressure side of said valve into proximity with said thermostat, which loop has no effective heating function, a valve in said loop to regulate the flow of fluid to said thermostat, said radiator having a discharge outlet which is open to the atmosphere at a point remote from said thermostat.

phere at a point remote from said thermostat, and a valve interposed between said loop and the radiator which may be set to limit the flow into the radiator.

17. The combination with a system of radiating pipes constantly open to the atmosphere, of a device for controlling the flow of a heating fluid to said pipes, said device comprising a valve and a valve actuating thermostat, a fluid conduit arranged to receive the heating fluid after it has passed the inlet side of said controlling device and to conduct said fluid to the thermostatic member of said controlling device, said conduit affording a circuit for the heating fluid other than that provided by said system of radiating pipes having no effective heating function, all so arranged that the controlling device will be influenced and caused to operate by the thermostatic condition of the heating fluid in said conduit.

18. The combination with a system of radiating pipes, of a controlling device having a high pressure chamber, a low pressure chamber, a valve between said chambers, a thermostat chamber, a thermostat therein adapted to operate said valve, a system of radiating pipes leading from the low pressure chamber and having an outlet to the atmosphere, and a conduit having no effective heating function and having one of its ends in communication with the low pressure chamber and the other end in communication with the thermostat chamber, whereby fluid is received by the conduit from the low pressure chamber and delivered to the thermostat chamber.

EGBERT H. GOLD.

Witnesses:

P. H. TRUMAN,
E. L. BREIDERT.