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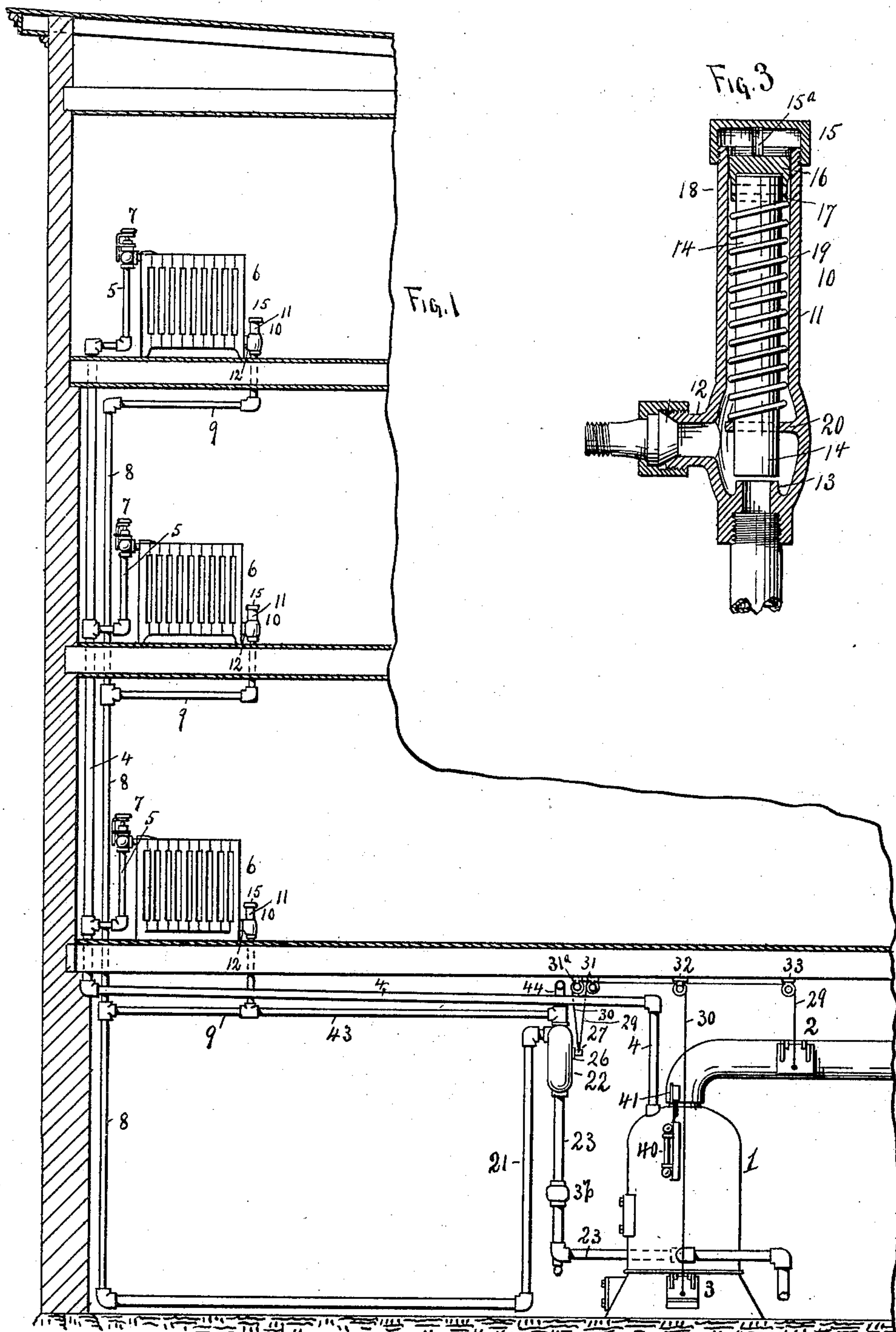
Patented July 15, 1902.

H. A. R. DIETRICH.
STEAM HEATING SYSTEM.

(Application filed Apr. 16, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
C. H. Woodward
J. H. Riley

H. A. R. DIETRICH, Inventor
By C. A. Snow & Co., Attorneys

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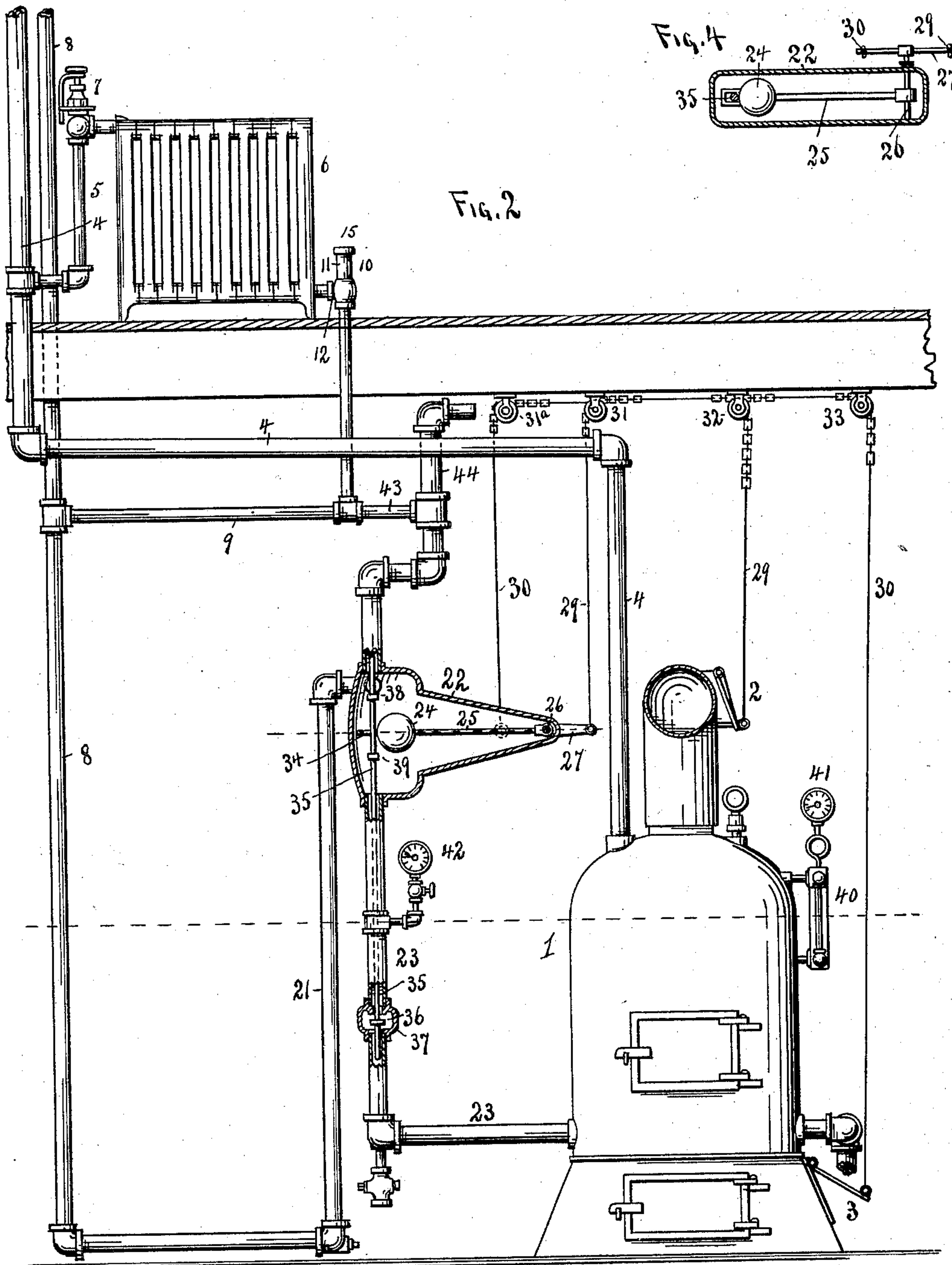
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C. N. Woodward,
J. F. Riley

H. A. R. DIETRICH, Inventor
By *C. A. Snow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

HARRY A. R. DIETRICH, OF SOUTH BETHLEHEM, PENNSYLVANIA.

STEAM-HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 704,623, dated July 15, 1902.

Application filed April 16, 1901. Serial No. 56,118. (No model.)

To all whom it may concern:

Be it known that I, HARRY A. R. DIETRICH, a citizen of the United States, residing at South Bethlehem, in the county of Northampton and State of Pennsylvania, have invented a new and useful Steam-Heating System, of which the following is a specification.

The invention relates to a system of steam heating.

10 The object of the present invention is to improve the construction of steam-heating systems and to provide a simple, efficient, and comparatively inexpensive one designed to be operated with a low pressure of steam
15 and adapted to conduct condensed water from the radiators to the steam boiler or generator and allow the escape of air from the radiators to the return-pipe without permitting the escape of steam into the same, whereby the entire body of steam generated is utilized for
20 heating purposes and the consumption of the same reduced to a minimum and the deleterious effects of permitting steam to escape prevented.

25 A further object of the invention is to provide a steam-heating system of this character adapted to control automatically the draft, and thereby secure a uniform steam-pressure, and capable of permitting the radiators to be
30 operated independently of one another and to be supplied with a greater or less amount of steam without affecting the operation of the system.

35 The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

40 In the drawings, Figure 1 is an elevation of a steam-heating system constructed in accordance with this invention and shown applied to a building, the latter being in section. Fig. 2 is an enlarged elevation of the lower portion of the system, parts being in section to illustrate the construction for controlling the
45 draft. Fig. 3 is a detail sectional view of the automatic valve for permitting the escape of air and water and for preventing the escape of steam to the return-pipe. Fig. 4 is a detail
50 view illustrating the arrangement of the arms of the lever which is connected with and controlled by the float of the receiver.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

55 1 designates a steam-generator designed to be of the ordinary construction and provided with upper and lower dampers 2 and 3, located, respectively, at the smoke pipe or flue and at the bottom of the generator for controlling the
60 draft through the smoke-pipe or connection and through the base of the steam-generator to the fire, and these dampers are controlled by means hereinafter described for maintaining a uniform steam-pressure throughout the
65 system. Extending from the top of the steam-generator is a steam-supply or feed pipe 4, which is connected by branch pipes 5 with radiators 6, located within the various com-
70 partments to be heated, and the said branch pipes are connected with the tops of the radiators and are provided with suitable valves 7 for controlling the admission of steam to the radiators. The steam is admitted to the radi-
75 ators at or near the top of one end and the water resulting from the condensation of the steam escapes at the bottom of the other end of each radiator into a return-pipe 8, provided
80 with branches 9, connected with the radiators. Each radiator is provided at its point of connection with the return-pipe with an automatic valve 10, adapted to permit the escape of air and water and capable of preventing
85 steam from entering the return line or pipe should the steam admitted to the radiator be in excess of that quantity capable of being condensed by the radiator. This valve com-
90 prises a valve-casing 11, provided at one side with a tubular extension or nipple 12 and having a seat 13 at its bottom and an expansible valve-plug 14, located above the valve-
95 seat and normally arranged as illustrated in Fig. 3 of the accompanying drawings. The valve-casing is disposed vertically and is provided at its upper end with exterior screw-
100 threads, which are engaged by a removable cap 15 for covering the top of the casing and for adjusting the expansible valve-plug. The upper end of the expansible valve-plug is secured by a transverse pin 18 to a cap or head
16, having a socket 17 for the reception of the upper end of the expansible plug. The valve-
plug 14 is supported by a coiled spring 19, disposed on the said plug 14 and having its

lower end arranged on a horizontal support 20, extending from the walls of the casing at a point above the valve-seat and provided with an opening receiving the lower portion 5 of the valve-plug, whereby it is adapted to guide the same and hold the plug in proper position over the valve-seat. The upper end of the spring engages the lower edge of the cap or head 16, and the threaded cap 15 is 10 provided with a central depending lug or projection 15^a, engaging the upper face of the inner cap or head 16 and forming a stop to limit the upward movement of the valve-plug. The screw-cap forms an adjusting device for 15 varying the distance between the lower end of the valve-plug and the valve-seat. Any other means may be employed for adjusting the valve-plug to set it in proper position with relation to the valve-seat. The auto- 20 matic valve is normally open for the passage of air and water; but when the valve-casing becomes filled with steam the latter will encircle and envelop the sensitive plug and will cause the same to expand and close against 25 the valve-seat, and thereby prevent the escape of steam into the return-pipe. The automatic valve will remain closed until the water resulting from the condensation of steam collects within the valve-casing and reduces 30 the temperature of the valve-plug. The return pipe or line has a depending loop portion extending downward to the base of the generator or to a point substantially in the same plane as the base of the generator and 35 provided with a short upwardly-extending branch 21, which is connected with a receiver and pressure-controller 22, located at a point above the water-line of the steam generator or boiler and connected with the bottom of 40 the same by a pipe 23. The return-line may extend downward to within a convenient distance above the inlet of the receiver, and it may be directly connected with the same to form a dry gravity return; but the construction which is illustrated in the accompany- 45 ing drawings and which forms a submerged return is especially advantageous, as it will enable the pipes to be arranged so as to avoid obstructing doorways or other passages. 50 Within the receiver 22, which is provided with a tapering approximately triangular horizontally-disposed casing, is arranged a float 24, which is connected with an arm or lever 25, secured at one end to a transverse 55 shaft 26 and adapted to rock the latter as the float rises and falls, as hereinafter explained. The shaft is provided with an exterior lever 27, arranged at one side of the casing and extending in opposite direction from the shaft 60 to provide a pair of arms to which are attached damper-chains 29 and 30, extending to the upper and lower dampers 2 and 3. The connections 29 and 30, which extend from the arms of the lever 27, are continuous and 65 independent of each other and may be of any desired construction. They extend upward to suitable guide-pulleys 31 and 31^a and are

provided thereat with chains or other flexible devices, and they depend from guide-pulleys 32 and 33, being also provided at these points 70 with suitable chains, as clearly illustrated in Fig. 2 of the accompanying drawings; but any other form of connection, such as a wire rope or cable, may be employed. By this construction the dampers 2 and 3 are reversely 75 operated, and when the float 24 rises the lower damper or door at the ash-pit or base will close and the upper damper 2 will open. When the float drops, the lower damper or door 3 will open and the upper damper will close. 80 The arm or lever 25, which extends longitudinally of the tapering triangular casing, is adapted to oscillate therein, and it is provided with an opening 34, through which passes a vertically-movable rod 35, forming 85 a valve-stem and extending upward from a check-valve 36, located in a casing 37, forming a portion of the pipe or tube 23. The valve stem or rod is guided in the vertical portion of the pipe or tube 23, and it is pro- 90 vided above and below the arm or lever 25 with stops or buttons 38 and 39, adapted to be engaged by the said arm or lever. The connecting pipe or tube 23, which extends 95 from the receiver to the bottom of the boiler or steam-generator, is preferably composed of a vertical branch and a horizontal branch, as clearly shown in Fig. 2 of the drawings. When the pressure within the boiler or gen- 100 erator increases, it will raise the column of water within the vertical portion of the connecting pipe or tube 23 and force the same into the receiver, which will raise the float. The float is adapted to move vertically be- 105 tween the stops or buttons without affecting the check-valve; but when the pressure within the boiler or generator increases sufficiently to cause the float to engage the up- 110 per stop or button 38 the rod or valve-stem will be moved upward and the check-valve will be closed against the seat at the top of the casing 37. This will prevent any more 115 water leaving the steam generator or boiler through the pipe or connection 23 and constitutes a valuable factor for the safety of the generator or boiler. The check-valve will re- 120 main closed only until sufficient water accumulates in the receiver to overcome the pressure within the boiler or generator, when the weight of the water will open the valve and 125 allow the water to flow into the boiler or generator. The float of the pressure-controller and receiver is adapted to operate normally independently of the check-valve, and when 130 the water accumulates in the receiver the float will rise and close the draft to the fire, thus checking the fire, and when the water recedes in the receiver the float will fall and the draft will be opened, thereby automatic- 135 ally controlling the draft to the fire.

The boiler or generator is provided with a glass gage 40 for indicating the height of the water within the boiler or generator, and a suitable pressure-gage 41 is provided for in-

dicating the steam-pressure within the generator or boiler. Also the pipe or connection is provided with a gage 42 for indicating the height of the water within the receiver and the pipe or connection 23.

The air escapes from the return-pipe through a horizontal air-pipe 43, located above the receiver 22 and connected with a vertical air-pipe 44, extending upward from the said receiver a sufficient distance to prevent any overflow of water through it. The upwardly-extending pipe or connection 44, which may be arranged at any desired point, communicates with the atmosphere. The horizontal air-pipe is located below the lowermost radiator of the series, and the waste pipe or branch of the latter may be connected with the said air-pipe, as illustrated in the accompanying drawings, or it may be connected with any other portion of the return line or pipe. The water may drain through the air-pipe 43 and through the upwardly-extending pipe or connection 44; but there is no liability of its accidentally overflowing and escaping from the upper open end of the said pipe 44. This pipe or connection also permits the air to escape from a receiver as the latter fills up.

The valve 7 for controlling the admission of steam into the radiators may be of any desired construction, and it can be operated by hand, like the one indicated in the accompanying drawings, or an automatic valve or thermostat may be employed for this purpose.

The steam-heating system is adapted to feed to any of its radiators any amount of steam within the capacity of the system, including pressure to secure the proper temperature in the apartment in which the radiator is located, and it will prevent all loss of steam by retaining the same within the radiators, exhausting all air and water from the latter and returning the water by gravity to the generator or boiler without permitting the steam to enter the return line or pipe. By these means the efficiency of the heating effect of the radiators is increased, thereby lessening the size or amount of heating-surface of the same, and consequently reducing the cost of construction and the floor-space occupied by the radiators.

When the float within the receiver is elevated by means of pressure from within the generator or boiler, a certain fixed pressure exists throughout the steam-supply and feed pipes; but this pressure does not extend to the return pipes or lines or manifest itself within the same. This pressure is also not manifested in the radiators while open to the atmosphere unless the latter are fed with more steam than they can condense, in which case the automatic valve will close the outlet and prevent the steam from passing into the return-pipes, allowing pressure to accumulate. When a fire is started in the furnace of the

steam generator or boiler and pressure forms, the pressure forces water from the generator or boiler upward in the pipe or connection 23 into the receiver and pressure-controller until it reaches the float, when it will operate the latter and automatically control the draft, which will vary according to circumstances. The pressure within the generator or boiler will determine the distance between the water-line within the boiler or generator and the artificial water-line within the receiver, and the height of the artificial water-line may be readily ascertained from the pressure-gage 42. Should the pressure become too great or too much steam be fed to the radiators, then the automatic outlet-valves will close and prevent the steam from flowing from the radiators into the return-pipes; but any condensation will escape from the radiators and return to the generator, as before explained.

What I claim is—

1. In a steam-heating system, the combination of a boiler or generator, the supply and return pipes, a receiver located above the water-line of the boiler and connected with the return-pipes, a pipe extending from the receiver to the bottom of the boiler or generator a check-valve located at a point between the receiver and the boiler or generator in the pipe connecting the same, and a float located within the receiver and connected with and adapted to operate the check-valve, substantially as and for the purpose described.

2. In a steam-heating system, the combination of a boiler or generator, supply and return pipes, a receiver located above the water-line of the boiler and connected with the return-pipes, a pipe or connection extending from the receiver to the bottom of the boiler or generator and provided with a check-valve, a float located within the receiver and connected with and adapted to operate the said valve, and a damper connected with and operated by the float, substantially as described.

3. In a steam-heating system, the combination of a boiler or generator, supply and return pipes, a receiver connected with the return-pipes and located above the water-line of the boiler, a connecting-pipe extending from the receiver to the bottom of the boiler and provided with a check-valve, a rod or stem extending from the check-valve and provided with stops or buttons, located within the receiver, an arm or lever provided with a float and arranged to engage the stops or buttons, and a damper connected with and operated by the arm or lever, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY A. R. DIETRICH.

Witnesses:

GEO. A. HISKEY,
WM. F. MILLER.