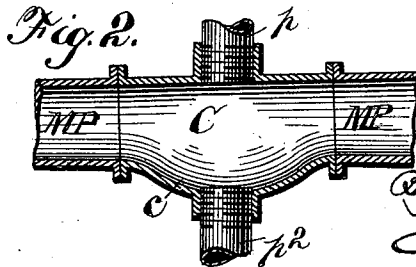
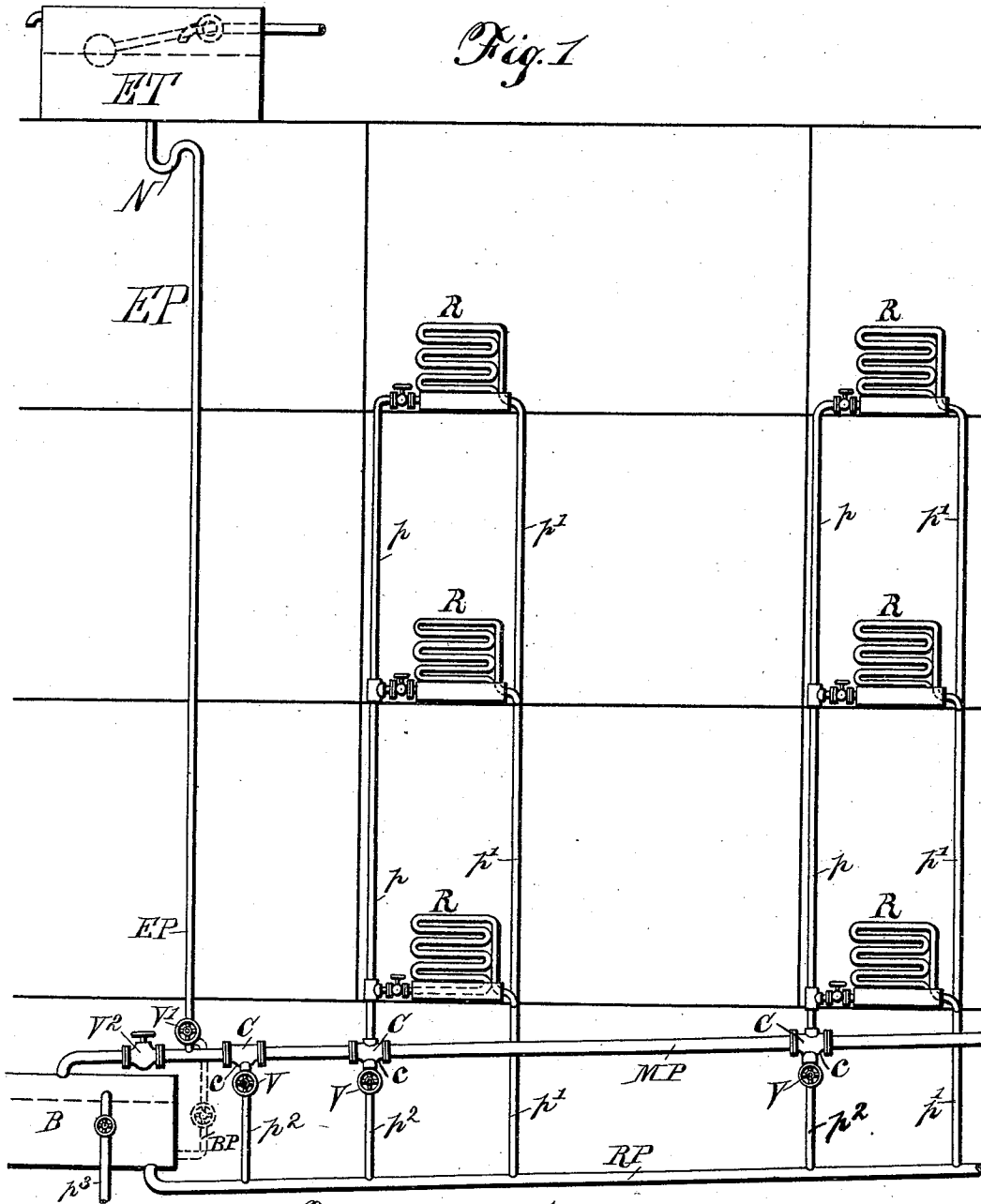


(No Model.)

M. W. BAYLISS.
SYSTEM OF HEATING.

No. 499,412.

Patented June 13, 1893.



Witnesses:

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UNITED STATES PATENT OFFICE.

MAJOR W. BAYLISS, OF WASHINGTON, DISTRICT OF COLUMBIA.

SYSTEM OF HEATING.

SPECIFICATION forming part of Letters Patent No. 499,412, dated June 13, 1893.

Application filed November 14, 1892. Serial No. 451,946. (No model.)

To all whom it may concern:

Be it known that I, MAJOR W. BAYLISS, a citizen of the United States, residing at Washington, District of Columbia, have invented a System of Heating; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention has relation to the art of heating buildings, and it has for its object the provision of means whereby different heating media or agents, as steam or water, may be used in the same system. The difficulties in regulating the temperature within the spaces heated in accordance with atmospheric temperatures in heating apparatus as now constructed are well understood. In the use of steam as a heating medium it is not possible to so control the temperature as to bring it in accordance with the open air temperature when the latter is such as to require but little artificial heat to bring the temperature within the building in accord therewith. This is generally the case for longer or shorter periods in fall and spring when the temperature is too low to dispense with the use of artificial heat, and yet sufficiently high to require but comparatively low artificial heat within the building. In heating with hot water the greatest difficulty encountered is to produce sufficient heat within the building when the temperature outside is very low, without using piping and radiators of abnormally large heating surface as compared with those used for steam.

My invention has for its object the provision of means whereby these difficulties are entirely overcome, and this I attain by combining the two systems, so that either of the fluids, hot water or steam, can be circulated through the same system of piping and radiators, the heating fluids being preferably taken from one and the same source.

In the accompanying drawings I have illustrated my invention by the diagrammatical elevation in Figure 1, and Fig. 2 is a detail view.

The boiler, B, may be of any suitable con-

struction, but I preferably use any well known form of horizontal tubular steam boiler devoid of a steam dome, said boiler, B, being as usual located at a point below or on the same floor with the lowest space or apartment to be heated, as in the basement of a building, the main supply pipe, MP and the main return pipe RP being connected with the boiler, at the highest and lowest levels respectively. The boiler is as usual provided with the necessary pressure gage, safety valve or blow off and is or may be provided with well known automatic draft and temperature regulating devices. The building is preferably piped for steam, that is to say, all of the pipes, including main supply and return pipes and the branch supply pipes are of such dimensions as would ordinarily be used if the building were to be heated by steam. The branch return pipes that connect the radiators with the main return pipe will be of the same cross sectional area as the branch supply pipes that connect the said radiators with the main supply pipe so as to insure proper circulation when water is employed as a heating medium. The radiators, R, on the other hand, are constructed like those employed in the heating of buildings with hot water, but of substantially the same proportion in square feet of heating surface as they would be if steam were used alone as a heating medium, so that a suitable heat radiating surface is obtained whether hot water or steam is used as the heating medium. The radiators, R, in the different stories of the building are connected with the main supply pipe MP by pipes, *p*, and with the main return pipe by pipes *p'*.

At or near the point of connection of the branch supply pipes *p* with the main supply pipe MP, I connect the latter with the main return pipe RP, by auxiliary return pipes *p*², each of which is provided with a valve or stop cock V. These auxiliary return pipes serve to take the water of condensation from the branch supply pipes, *p*, and main supply pipe or pipes MP and conduct it to the main return pipe RP. The number of said auxiliary returns will depend not only on the number of risers or branch supply pipes, *p*, but on the length of main supply pipe employed, and in order that all water of condensation may be removed from said main supply pipe MP, I

arrange an auxiliary return pipe, p^2 , as near the boiler as possible to catch any water of condensation that may not be carried into the main return pipe.

- 5 Above the highest space to be heated, or above the radiators in the upper story I arrange an expansion tank ET of any well-known or suitable construction, said tank being connected by a suitable expansion pipe
10 EP, with the main supply pipe MP, and provided with a valve or stop cock, V' , at a point proximate to its connection with said main supply, which latter is or may be provided with a cut-off valve, V^2 . The pipes, p^2 , p^2 ,
15 connecting the main supply and return pipes serve to conduct the water of condensation from the branch supply pipes, p , and said main supply pipe MP, into the return main RP when steam is used as a heating agent,
20 and in practice I prefer to interpose a coupling, C so constructed as to form a pocket or slight depression, c , preferably diametrically opposite the point of connection of the vertical supply branches, p , with the main supply
25 pipe MP, the auxiliary return pipe, p^2 , being connected with the coupling at the shallowest point thereof, as more clearly shown in Fig. 2, for the purpose of collecting the water of condensation and preventing its flowing contrary to the steam along the main supply pipe
30 MP, into the boiler, whereby a better circulation is obtained and all hammering due to the presence of water in the supply pipe is avoided.
- 35 The expansion pipe EP, is provided near the expansion tank with a goose neck, N, so as to provide a cold water luting at all times at that point, and said pipe may be employed to supply the boiler with water when steam is
40 employed as a heating medium, and to this end the expansion pipe may have a valved branch pipe BP, shown in dotted lines in Fig. 1, but I prefer to use the expansion tank and pipe as a feeder only when hot water is employed as the heating agent, and provide a
45 separate feed pipe, not shown, to supply the boiler with water when steam is used as a heating medium.

- The arrangement described is of the simplest nature and does not involve a much greater expense than would be incurred in a steam heating system; the change from steam to hot water being equally simple and may be briefly described as follows: When hot water
55 is to be used the valve, V' , in the pipe EP connecting the expansion tank ET with the main supply pipe MP is opened while the valves V of all of the auxiliary return pipes, p^2 , are closed, the system filled with water and the boiler fire started to heat the water to the desired degree the circulation in the system being established in the usual manner. When steam is to be used the valve, V' , in the expansion pipe EP, is first closed. Then
60 the valve in the waste pipe, p^3 , is opened and the water is drawn from the system and sufficiently so from the boiler to form a steam

space therein, the valves, V , in the auxiliary returns being also open, and steam generated, the circulation being established in the usual
70 manner.

In the description of my invention I have deemed it unnecessary to go into details of construction, dimensions of service and return pipes, sectional area of radiators, &c., as
75 these form no part of it, and depend upon the area to be heated, and upon other conditions well understood by steam engineers.

Having thus described my invention, what I claim as new therein, and desire to secure by
80 Letters Patent, is—

1. In a system of heating buildings either by steam or hot water, the combination with a boiler, a supply and a return main respectively connected with said boiler at or near its
85 top and bottom, radiators such as used for hot water heating, with a radiating surface such as required for steam heating distributing pipes such as used for steam heating, return pipes of the same cross-sectional area as
90 the distributing pipes, said distributing and return pipes of less cross-sectional area than the supply and return mains and respectively connected with said supply and return mains and with the terminals of the radiators, and
95 suitable valves for controlling the flow of fluid through the system.

2. In a system of heating buildings either by steam or hot water, the combination with a boiler, a supply and a return main respectively connected with said boiler at or near its
100 top and bottom, radiators such as used for hot water heating, with a radiating surface such as required for steam heating distributing pipes such as used for steam heating, return pipes of the same cross-sectional area as
105 the distributing pipes, said distributing and return pipes of less cross-sectional area than the supply and return mains and respectively connected with said supply and return mains
110 and with the terminals of the radiators, an expansion tank located at a higher level than the radiators, a connection between the tank and the steam space of the boiler, means for supplying water to said tank, and suitable
115 valves for controlling the flow of fluid through the system.

3. In a system of heating buildings, the combination with a source of hot water and steam supply, a steam and hot water supply
120 main, suitable radiators and supply pipes connected with the main, a return main and connections between said main and the radiators, of an expansion tank, a valved connection between the tank and the source of hot
125 water and steam supply, and one or more valved auxiliary return pipes connecting the supply main with the return main at a suitable point or points, for the purpose set forth.

4. In a system of heating buildings, the
130 combination of a boiler, a supply main connected with the boiler at the highest point thereof, a return main connected with said boiler at or near its lowest point, heat radi-

ators connected with the supply and return
mains, one or more valved auxiliary return
pipes connecting the supply and return mains,
said auxiliary return pipe or pipes being con-
5 nected to the supply main at or near the point
of connection of the main with the radiators,
an expansion tank, and a valved pipe con-

necting the tank with the boiler at about the
same level as the main supply pipe, for the
purpose set forth.

MAJOR W. BAYLISS.

Witnesses:

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B. W. SOMMERS.