W. B. HAMMOND.

COMBINED HEATING AND SPRINKLER SYSTEM.

APPLICATION FILED JUNE 26, 1916.

1,229,071.

Patented June 5, 1917.

3 SHEETS—SHEET 1.

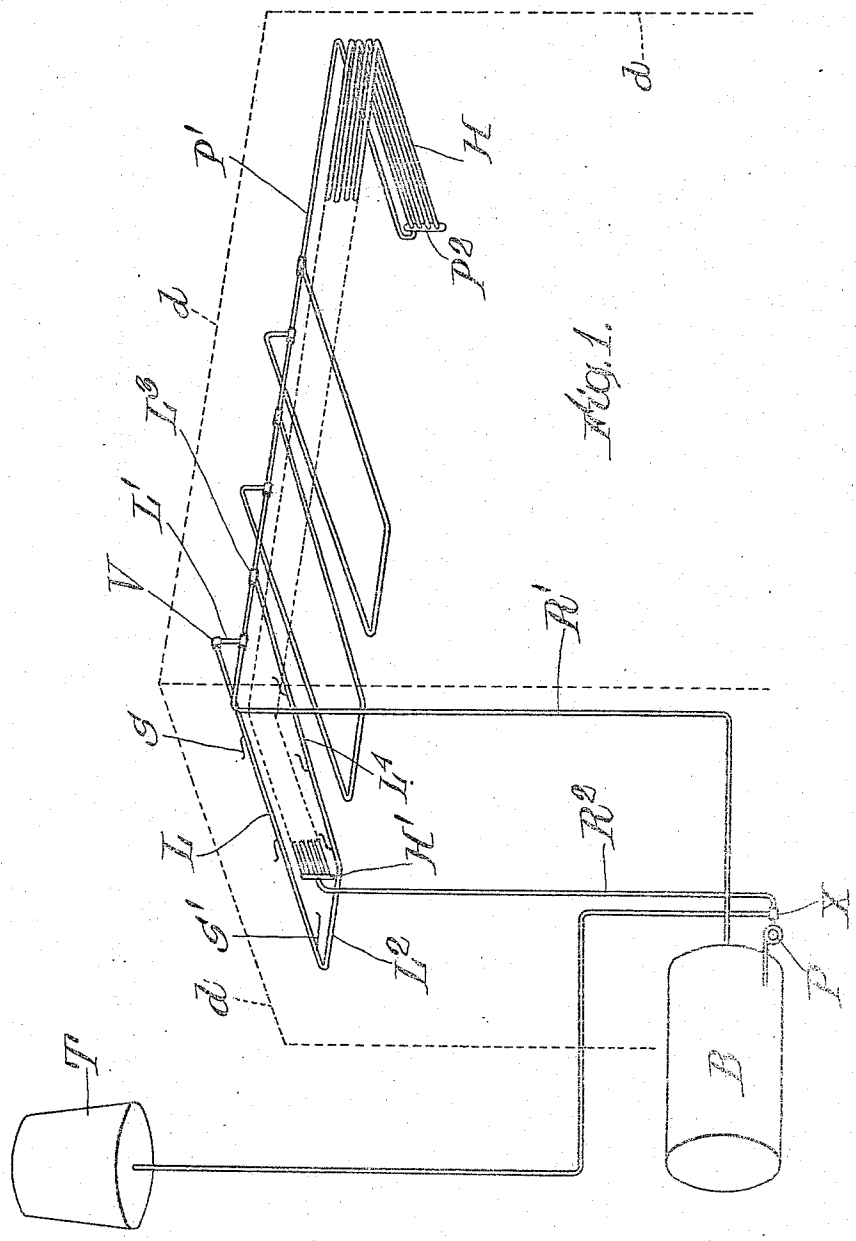


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 2.

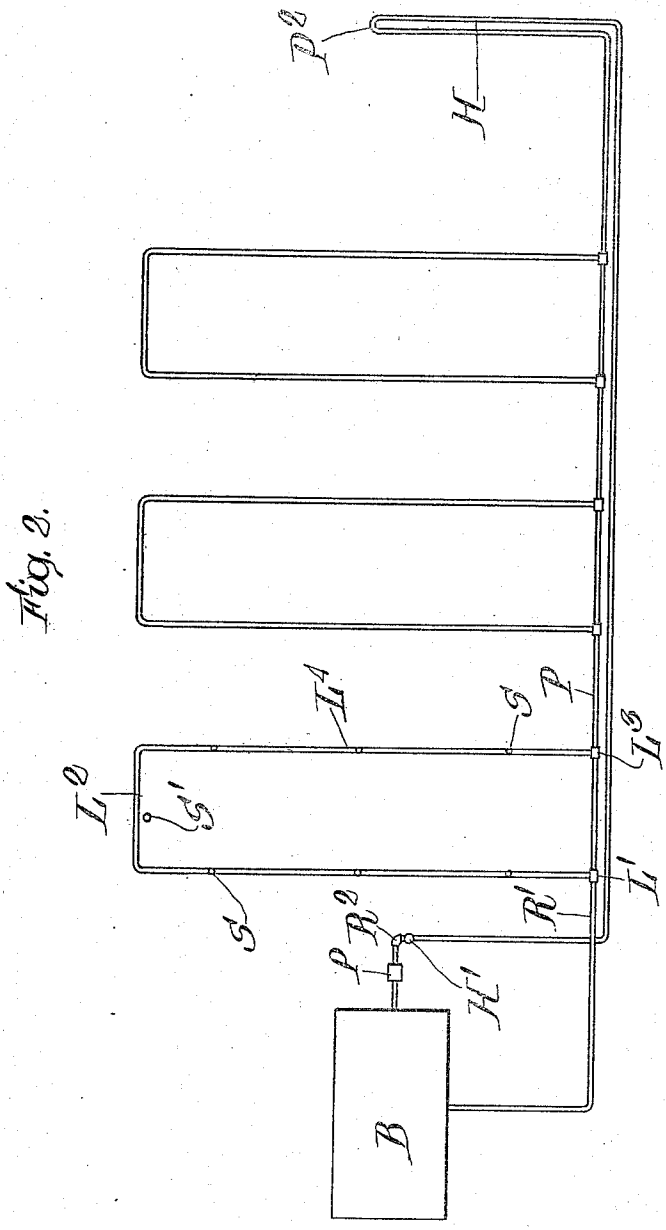
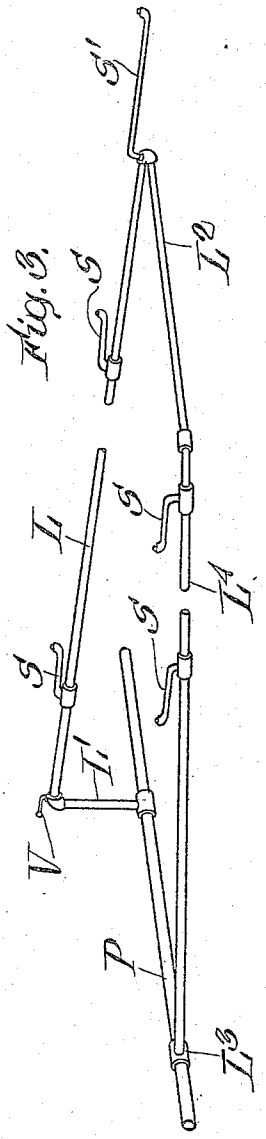


Fig. 3.



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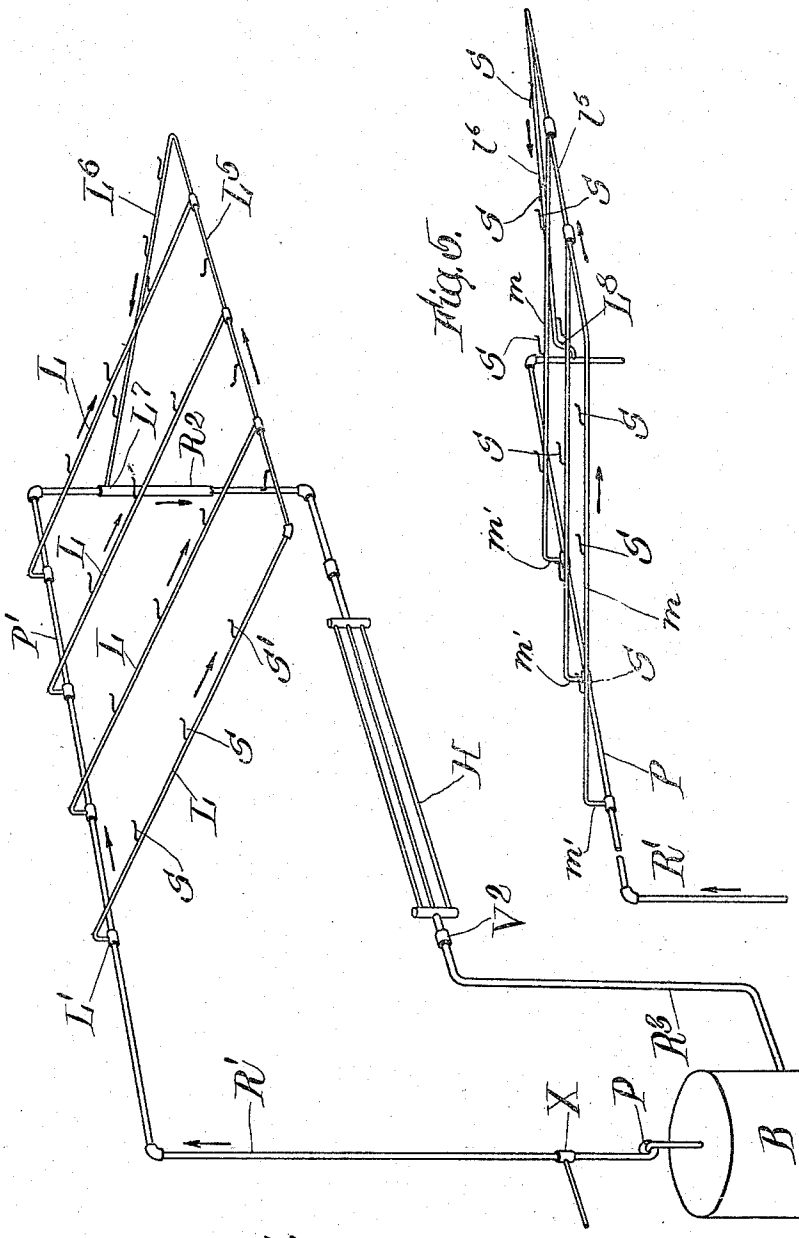


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

WILBERFORCE BEECHER HAMMOND, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO COMBINED HEAT AND SPRINKLER COMPANY, A CORPORATION OF MASSACHUSETTS.

COMBINED HEATING AND SPRINKLER SYSTEM.

1,229,071. Specification of Letters Patent. Patented June 5, 1917.

Application filed June 26, 1916. Serial No. 105,937.

To all whom it may concern:

Be it known that I, WILBERFORCE BEECHER HAMMOND, a citizen of the United States, and resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Combined Heating and Sprinkler Systems, of which the following is a specification.

My invention relates to combination hot water heating and fire-protective sprinkler systems, and consists of improvements by which such a system can be installed with economy of piping and operated with a minimum expenditure of power for maintenance of circulation. As will appear from the description of apparatus which follows, the design of my improved combination system is consistent with compliance with the approved practice both as regards heating systems and sprinker systems.

My invention is illustrated in the drawings hereto annexed in which—

Figure 1 is a perspective diagram representing the elements of my combination system in simple form;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a detail in perspective showing the arrangement of one of the sprinkler-equipped gravity circulation loops of Figs. 1 and 2;

Fig. 4 is a perspective diagram illustrating my invention in another form, wherein the gravity circulation loop comprises several branches in parallel connected to a common return; and

Fig. 5 is a perspective diagram showing another form in which my invention may be embodied.

In all the forms illustrated by the drawings, the circulation system comprises two water circulation circuits, one which I call the main circuit consisting of hot water pipes proceeding from and leading back to the heater; the other a water circulation circuit which in its essentials consists of a pipe circuit proceeding from and leading back to the pipes of the main circuit. This I call the secondary circuit.

The circulation in the main circuit is maintained by the expenditure of only so much power as is required for that circuit, the secondary circuit maintains its own circulation, drawing water from the main circuit and returning it thereto by gravity operation. If the heating effect of the secondary circuit pipes is not sufficient for heating purposes, radiation may be included in the main circuit. The fire protecting sprinklers are attached to the secondary circuit preferably by means of offset fixtures such as are described in my United States Patent No. 1,058,968 dated April 15, 1913. The form of fixture illustrated in Figs. 1 and 2 of the said patent is to be preferred, for reasons which will appear herein.

The apparatus shown in Figs. 1, 2 and 3 hereto annexed is constructed and operates as follows:

The main circuit comprises the heater B, up-riser R′, horizontal pipe P′, header or manifold P^2, radiator pipes H, header H′ and return R^2. If required, circulation in this main circuit may be maintained by means of a pump represented by P. Water supply under constant head will be provided for by a connection X with some source of supply, as illustrated by the tank T.

The secondary circuit is represented in this illustration by any one of the loops of pipe L′, L, L^2, L^3, L^4. A short riser L′ leads out of the top of the pipe P′, and to this short riser the inclined pipe L is connected, thence the loop is continued, including pipes L^2 and L^4, the latter conected to and entering the main circuit pipe at the side thereof at the point L^3. On this secondary circulation loop are mounted sprinkler offsets S, each connected by preference at the top of the loop pipe, as shown and described in my Patent No. 1,058,968, and each having a sprinkler head at its dead end.

The hot water in the pipe P′ rises into the pipe section L′, and the cooler water in sections L, L^2 and L^4 by its tendency to descend, keeps the water flowing in the loop and out through the union at L^3 into the pipe P′ again. To insure the proper filling of the secondary circulation loop, an air valve at V (see Fig. 3) is placed at the highest point in the loop, this being, in the illustration under description, at the junction of the pipe sections L′ and L. It will be advisable also to place an air collecting chamber at some other part of the circula-

tion loop, as at S′; this chamber may advantageously be made to consist of a sprinkler offset of relatively great length and therefore air-holding capacity.

The building in which the above described system is installed is indicated by the dotted outline *d* in Fig. 1.

The circulation in the secondary loop above described is wholly due to gravity and the differences in specific gravity between bodies of water having different temperatures, so that no load is put upon the circulation factor of the main circuit represented by the circulation pump P (Fig. 1). The secondary circulation circuits will, however, cause water to circulate rapidly enough to maintain effective heating temperatures in all portions of the secondary circuits, provided of course the water in the main circuit be kept effectively hot. Thus the secondary circuits supplement the radiators of the main circuit and reduce the heating surface requirements of the main circuit, while the power factor required to maintain circulation is not burdened with maintenance of circulation in the secondary circuits. The sprinkler heads on the fixtures S are kept cool in the manner described in my Patent No. 1,058,968 although these fixtures are always in open communication with the circulation pipes and ready to act as conduits for water in case a sprinkler head should release by reason of fire. It will be observed that the only riser and return from and to the heater is that required for the main circuit. As these are necessarily large pipes, and as the secondary circuits require only relatively small pipes, the economy in construction is obvious. If the installation is of modest size, so that circulation in the main circuit can be maintained simply by gravity, the addition of the secondary circuits will not affect this condition. By employing the combination of circuits above described, adequate circulation will be maintained through both main and secondary circuits with a circulation factor sufficiently effective to operate the main circuit alone.

The secondary circuit part of the system may be differently constructed, as indicated in Fig. 4, while operating in the same relationship to the main circuit as in the illustration shown in Figs. 1, 2 and 3. In Fig. 4 the several pipes *l*, each supplied by a short riser pipe *l′* which communicates with the top of the pipe P′, are arranged in parallel and all connect with a pipe L^5, which communicates with a return pipe L^6, the latter entering the main circuit at L^7. As with the simpler single loops of secondary circuit pipe shown in Figs. 1, 2 and 3, circulation in this secondary circuit of Fig. 4 is maintained by gravity operating through the different specific gravities of bodies of water at different temperatures. Here, as in the apparatus of Figs. 1, 2 and 3, the pipes *l* incline downward from their junction with pipes *l′*, and an air valve such as shown at V in Fig. 3 should be provided at the high point.

In Fig. 5 there is illustrated a further modification of my combination system in which the secondary circuit pipes *m* incline upward from their junctions with the short vertical pipes *m′*. This inclination conforms to accepted practice and underwriters' requirements in sprinkler system construction and is therefore preferable on these grounds. The junction pipe l^5 in this instance stands at the high level of the secondary circulation circuit, and from it the return l^6 extends downward and joins the main circuit at L^8. The secondary circulation system, being filled with water, protects itself against the formation of air pockets in the circulation pipes, by reason of the sprinkler offset fixtures S, which are intended to entrap and hold air, as described in my Patent No. 1,058,968. These sprinkler fixtures, in the construction shown in Fig. 5, are between the main circuit and the high level of the secondary circuit, so that any air bubbles that enter the secondary circuit will be caught by the sprinkler offsets where they are beneficial and not allowed to collect in the high level of the circulation pipe, where they might be detrimental. In practice it has been found that sprinkler heads so situated will frequently leak, though very slightly; there is little danger therefore that the sprinkler offsets will ever be all so full of air that additional air in the circulation pipes will find its way to the high level in the secondary circuit. Practically therefore, the arrangement shown in Fig. 5 is such that no air valves will be required.

Furthermore, by arranging part of the heating factors in the main circuit these can be cut out by means of valves, for purposes of repair, without cutting the sprinkler-equipped part of the system out of normal condition of readiness. Thus, if the heater H (Fig. 5) be cut out by closing valves at V′ and V^2, the sprinkler system remains in communication with the water supply at X and fire-protection is not affected.

I claim:

1. In a combined hot water heating and sprinkler system, the combination with the characteristic elements of a hot water circulation system of a circulation loop extending laterally from said circulation system and joined thereto at both ends of the loop, said loop comprising a relatively high-reaching riser at one end and a relatively low return connection at the other end and the pipes of the loop descending gradually from the level of the top of the riser to that

at the return connection, and fire-protecting sprinklers mounted on the inclined pipes of the loop.

2. In a combined hot water heating and sprinkler system, the combination with the characteristic elements of a hot water circulation heating system, of a circulation loop extending laterally from said circulation system and joined thereto at both ends of the loop, said loop comprising a relatively high reaching riser at one end and a relatively low return connection at the other end, and the pipes of the loop descending gradually from the level of the top of the riser to that at the return connection, fire-protecting sprinklers mounted on the inclined pipes of the loop, and an air collecting chamber attached to the loop.

3. In a combined hot water heating and sprinkler system, the combination with a main hot water circulation circuit and means to maintain circulation therein, of a circulation loop connected with said main circuit at both ends of said loop, one of its connections being at a higher level than the other, to maintain independent gravity circulation in said loop, and fire-protecting sprinklers mounted on the said gravity circulation loop.

4. In a combined hot water heating and sprinkler system, the combination of a main hot water circuit and means to maintain circulation therein, a secondary circuit consisting of a loop connected at both ends with the main circuit, the connection nearer the source of main circuit circulation comprising a riser from the top of the main circuit pipe, and sprinklers mounted on the pipes of the secondary circuit.

Signed by me at Boston, Massachusetts, this tenth day of June, 1916.

WILBERFORCE BEECHER HAMMOND.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."