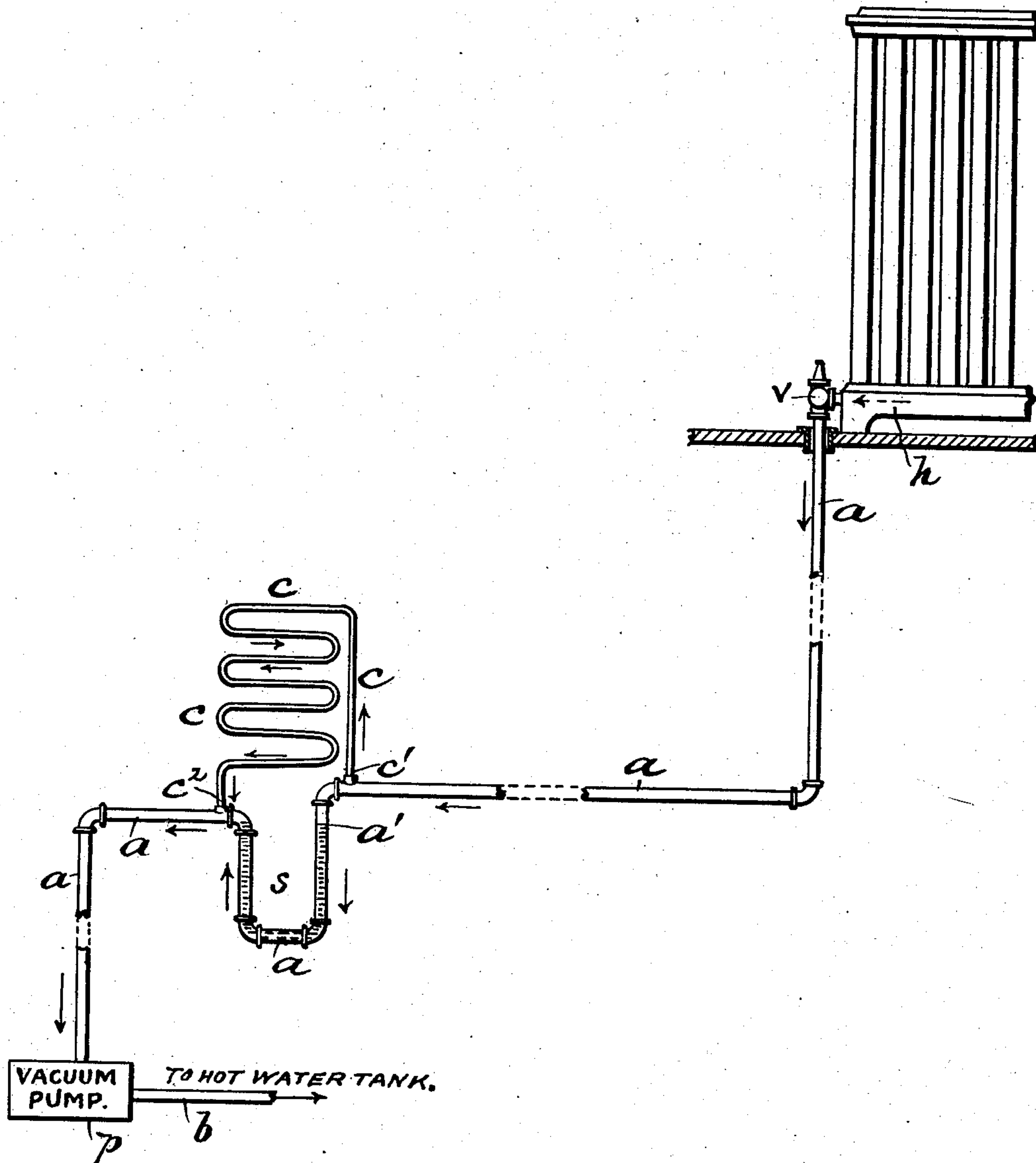


No. 842,180.

PATENTED JAN. 29, 1907.

T. F. DEXTER.
STEAM HEATING SYSTEM.
APPLICATION FILED NOV. 25, 1905.



WITNESSES:

C. J. Hannigan
Calvin H. Brown

INVENTOR.

Thomas F. Dexter.

By Geo. H. Remington
Atty.

UNITED STATES PATENT OFFICE.

THOMAS F. DEXTER, OF PROVIDENCE, RHODE ISLAND.

STEAM-HEATING SYSTEM.

No. 842,180.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed November 25, 1905. Serial No. 289,064.

To all whom it may concern:

Be it known that I, THOMAS F. DEXTER, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Steam-Heating Systems, of which the following is a specification.

My present invention relates to improved means for automatically disposing of or exhausting the water of condensation from the radiators or heaters of low-pressure steam-heating systems.

In steam-heating systems of the class referred to and as usually devised the steam-actuated vacuum or circulating pumps employed for pumping the water of condensation from the radiators into a hot-well or boiler are liable in normal action to become temporarily inoperative by reason of the inflow of steam from the return-main of the system whenever the pump has exhausted the body of water therefrom. In such case the pump, owing to the loss of the suction-head, becomes hot by reason of the higher temperature of the inflowing steam, runs with increasing speed, or "races," as it is termed, and no useful work results, but instead a loss of steam and power. In some cases a water seal is employed in the return-main. This, however, fails to wholly correct the defect just referred to, because the action of the pump frequently empties the body of water in the seal and allows the steam to follow into the pump, thereby causing the latter to race, &c., as before stated. In order to overcome or neutralize such abnormal pump action, water from some external source is employed both to condense said steam and to recharge the pump, so as to render the latter's action normal.

The object I have in view is to provide steam-heating systems of the class above referred to with simple, inexpensive, and automatically-operating means adapted to wholly overcome the before-mentioned disadvantages, the arrangement being such that an efficient water seal is maintained in the return-main at all times, thereby preventing the direct influx of steam from the main into the pump and also dispensing with the use of condensing-water.

In carrying out my invention the return-main is placed in continuous open communication with the radiator and pump, said main being provided with an interposed

valveless continuously-maintained water seal or trap. The main is also provided with a valveless condensing-coil in continuous open communication with the main and bridging said seal and arranged whereby the greater volume of the water of condensation in the heating system flows from said main into the circulating-pump by gravity, said open coil at the same time receiving and condensing any steam or vapor passing there-through, the corresponding or resulting water flowing into the main at a point beyond said trap. At the same time, too, the air then having a comparatively low temperature also flows through the coil and passes uninterruptedly to the pump, thereby producing in the latter a practically normal movement and preventing the breaking of the seal and the resulting abnormal action of the pump.

In the accompanying drawings, illustrating my improvement in vacuum heating systems, the return-main *a* thereof is adapted to be connected with the outlet or discharge end of the radiators in any suitable way, in practice a "vacuum-valve," so called, or other analogous device having a contracted passage therethrough being employed, as indicated at *v*, the latter opening directly into said return-main at a point contiguous to the lower end *h* of the radiator, substantially as usual. The return-main *a* is valveless and open throughout its length and discharges into the continuously-running vacuum-pump, (indicated at *p*), the latter being located below the general level of pipe *a*. At a point, say, near the pump the pipe is bent downwardly to form a U-shaped seal or trap *s*, which is always kept filled with water, thus checking and preventing any steam or vapor which may have passed from the radiator and outlet *v* into the main *a* from entering the pump. Whenever the level of the hot water in the main rises above that in the seal, as at *a'*, the surplus flows directly therefrom to the pump by gravity action alone.

In order to provide means for condensing the steam or vapor which may be in the main *a*, as well as to prevent the pump from drawing or siphoning the water out of the seal, I employ a continuously-open suitable surface condenser or cooling-coil *c*, the same being valveless and extending vertically above the main *a*. The inlet end *c'* of the condenser enters the return-main in advance of the seal, its outlet or discharge end *c''* tapping the main beyond the seal—in fact, bridging it—all

as clearly shown. Thus it will be evident that the normal temperature of the air surrounding the condenser will operate to condense any steam or vapor, say, of 190° to 212° temperature circulating therein, said water of condensation flowing therefrom into the return-main and pump by gravity. (See arrows.)

It will be seen that in the construction and arrangement of the return-main *a* and condenser *c* no valves whatever are employed, all the said piping being in continuous open communication with the vacuum-pump *p*, the arrangement being such that the seal *s* is located or interposed between the inlet and discharge ends of the condenser. Therefore no siphoning effect, due to the action of the vacuum-pump, can take place, the result being to produce a more uniform pump action, together with the added advantages, such as economy and efficiency, hereinbefore set forth. The water is discharged from the pump to a hot-water tank or other suitable reservoir via the exhaust-pipe *b*, from which tank the water may be pumped into the boiler or steam-generating source in any well-known manner.

I claim as my invention—

1. In a steam-heating system of the character described, a heater or radiator having

a controlled outlet and a circulating-pump, in combination with a continuously-open return-main interposed between and uniting said radiator and pump members, a water seal located in said main, and a condenser or coil tapped into and being in continuous open communication with the main and bridging said seal, so that all the water of condensation in said main and coil flows to the pump by gravity, the open coil also permitting the free passage of air to the pump to prevent the latter from breaking the seal, substantially as hereinbefore described.

2. In a steam-heating system, the combination of a radiator, a circulating-pump, a return-main connected with said radiator and pump, a water seal located in said main, and a surface condenser or coil connected with the main at each end of said seal and being in open communication therewith, constructed and arranged so that the water of condensation flows to said pump by gravity, substantially as described.

Signed at Providence, Rhode Island, this 24th day of November, 1905.

THOMAS F. DEXTER

Witnesses:

GEO. H. REMINGTON,
C. A. PEIRCE.