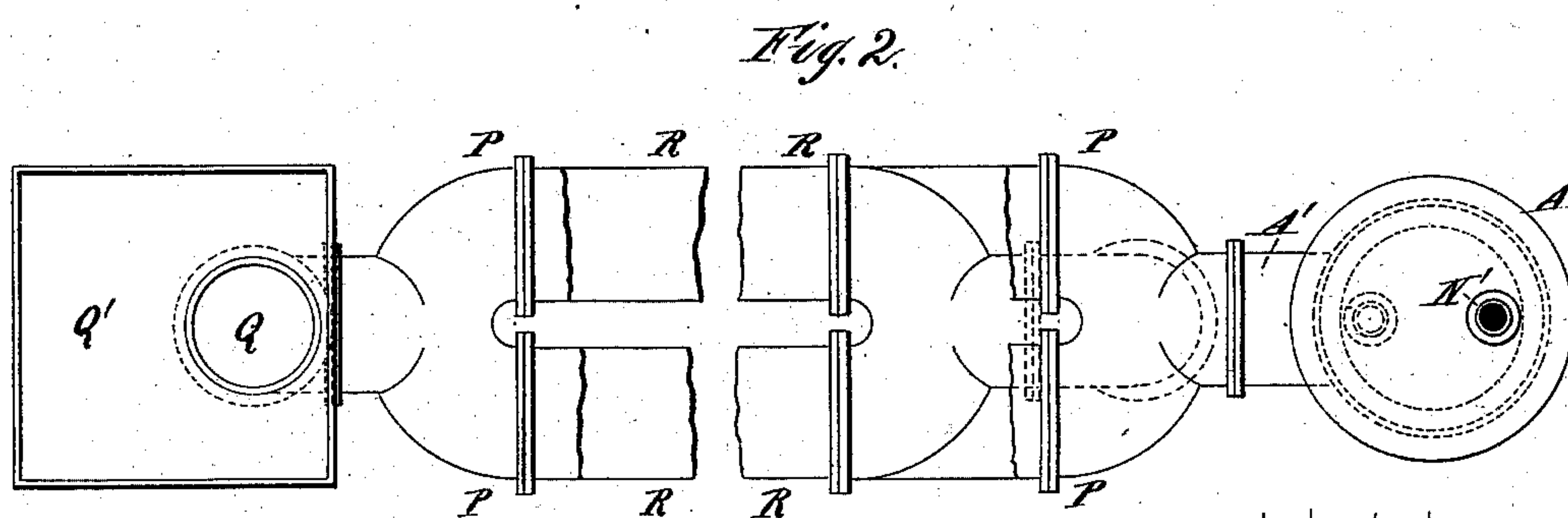
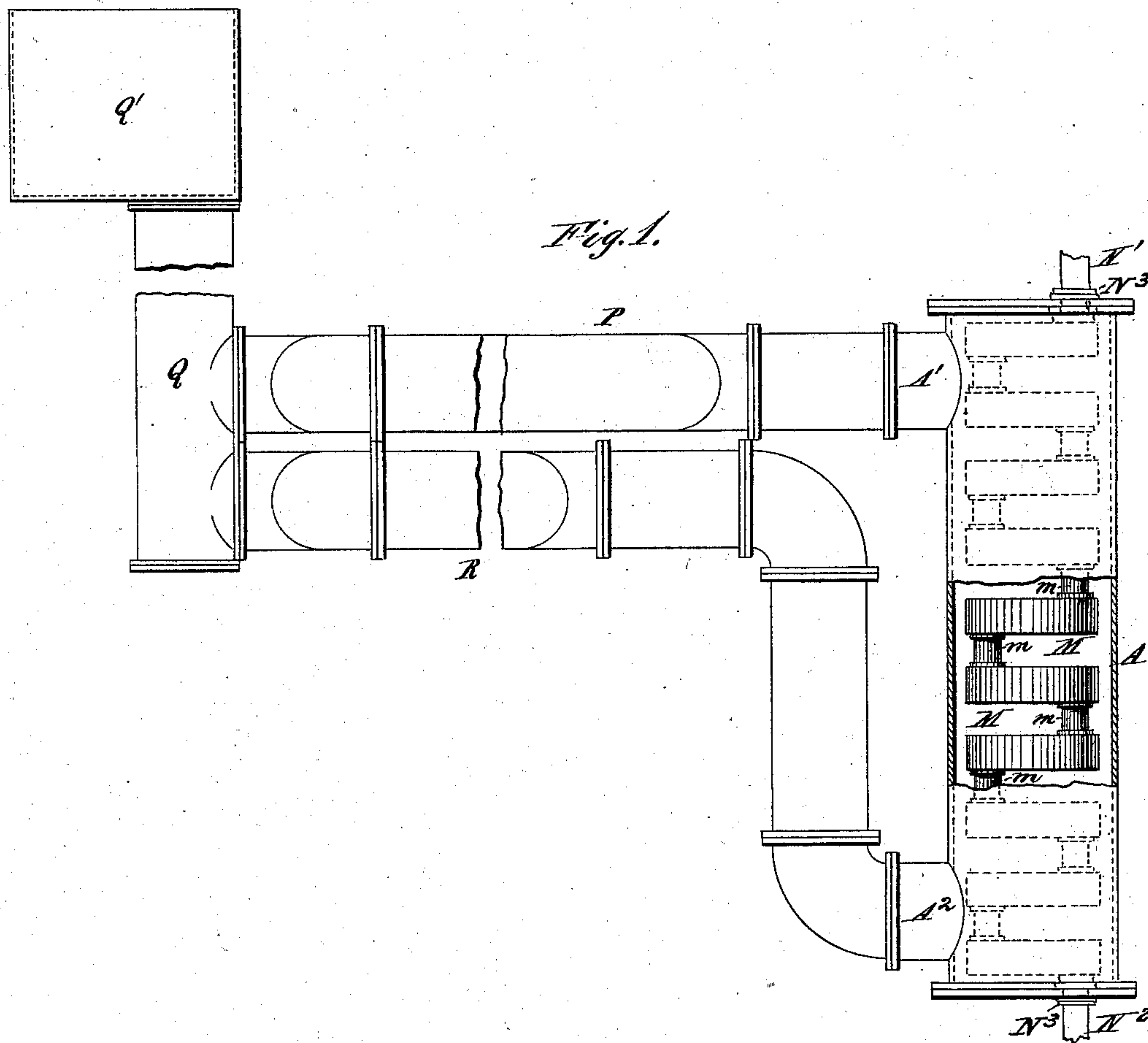


(No Model.)

T. FAIRBANKS.
Hot Water Apparatus.

No. 237,508.

Patented Feb. 8, 1881.



WITNESSES—

Charles R. Searle.
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UNITED STATES PATENT OFFICE.

THADDEUS FAIRBANKS, OF ST. JOHNSBURY, VERMONT.

HOT-WATER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 237,508, dated February 8, 1881.

Application filed August 10, 1880. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS FAIRBANKS, a citizen of the United States, residing at St. Johnsbury, Caledonia county, in the State of Vermont, have invented certain new and useful Improvements relating to Apparatus for Heating Buildings by Hot Water, of which the following is a specification.

My invention is of that class in which the heat is received in the form of steam through a small pipe from a steam-boiler at any convenient distance, and the heat thus received is communicated through metal pipes or chambers to a quantity of water, which latter circulates through suitable pipes, and forms a means for conveniently and equally warming the air, with marked advantages over the warming by the radiation and convection from steam-pipes direct. I have overcome a difficulty sometimes serious in this class of apparatus—the difference of expansion of the steam-pipe and of the water-vessel through which it passes.

I provide an upright water-vessel of liberal height and sufficient cross-sectional area, with rigid connections at the top and bottom. There need be no stuffing-boxes or any kind of slip-joint, and all adjustment, attendance, and risk of leakage are thereby avoided. Expansion and contraction of the steam apparatus within the water-vessel is allowed for by a peculiarity of construction. Instead of a direct pipe, there is a series of short pipes and horizontal connecting-chambers, so that the steam-passage is sinuous. The construction allows springing. When the whole is cold the metal of the sinuous passage may be at rest or slightly stretched. When steam is admitted, heating up this metal above that of the outer case, the metal expands and endeavors to assume a greater length. This expansion leaves the metal at rest if it was before stretched. It cramps it or subjects it to a compressive strain if it was before at rest; but the construction allows it to spring enough to accommodate either condition.

I have made the horizontal chambers in a circular form, so that they are, in fact, short hollow cylinders.

The water heated by this sinuous construction rises actively in the water-chamber and circulates through the system of pipes pro-

vided. I arrange the air-warming pipes in horizontal series.

I have shown only two pipes in the outward flow and two a little shorter in the return flow; but the number may be increased indefinitely.

I arrange the expansion-box for the storage of the surplus water at the part of the apparatus farthest from where the heat is received.

The following is a description of what I consider the best means of carrying out the invention. The accompanying drawings form a part of this specification.

Figure 1 is an elevation of the entire apparatus, a portion being broken away to show the interior construction. Fig. 2 is a plan view, with a portion of the outflow apparatus broken away.

For convenience of showing the important parts on a large scale, both figures are drawn with portions broken out of the horizontal pipes and the ends brought near together.

Similar letters of reference indicate like parts in both the figures.

A is an upright water-vessel, of boiler-iron or other suitable material, with removable ends, and with capacious nozzles A' A². The upper nozzle, A', forms a junction for a set of pipes, which are extended to any required distance and branched into any number of parallel or otherwise disposed pipes P, which are again gathered at the other end into a single pipe, which is flanged or otherwise securely joined to an upright pipe, Q, carrying a liberal expansion-box, Q', at its upper end. From a lower point in the pipe Q extends a horizontal pipe, which is branched into any number of parallel or otherwise arranged pipes R. These are gathered together again at the end nearest the principal upright vessel A, and led down through smoothly-curved connections and joined to the lower nozzle, A². This forms the apparatus for containing and circulating the water, which is supplied as required through the expansion-box Q'.

Within the upright vessel A are mounted a series of stout hollow disks, M, of cast-iron or other suitable material, placed horizontally one above another, with liberal spaces between, connected at alternate ends, as shown, by short lengths of pipe, m. To the uppermost of these disks M is connected a pipe, N', which re-

ceives steam from the boiler at a distant point, (not represented.) To the lower of the series of the disks M is connected another pipe, N², which may lead back to the boiler in case the
 5 conditions are favorable for a constant circulation of the steam and water back and forward between the boiler and the disks M; or where conditions are not suitable for that mode of working the water resulting from the
 10 condensation of the steam may be trapped out as it accumulates.

The points of junction of the pipes *m* with the disks M may be fitted with strong and broad bearing-collars to insure perfect connections. The passages of the pipes N' N² through
 15 the heads of the vessel A may be fitted by a collar on one side and a nut on the other, with red lead or other suitable packing between to insure a rigid and durable connection. Any
 20 other mode of connection may serve which will be strong, tight, and rigid. The parts M *m* spring to accommodate themselves to the expansion and contraction, so that no mischief results.

The arrangement of the pipes P R in horizontal series is especially successful in green-houses. It allows an equable distribution of the heat through a number of large pipes, which, by reason of their being level, have an
 30 equal tendency to carry the hot water, and all are equably heated.

The arrangement of the expansion-box Q' at the end of the apparatus farthest from the heating-vessel A avoids the interruption to the circulation of the air which is produced
 35 when such box is mounted, as usual, on the hottest end of the apparatus, and avoids the inconvenience in examining and replenishing when, as is sometime the case, the water is being worked very hot. It is always sufficiently
 40 cool at the distant end of the apparatus to avoid a generation of vapor. The box Q' can be left open or simply provided with a loose cover of metal or wood.

I have represented the chambers M as circular cases mounted concentrically within the vessel A, of such size as to allow a liberal space around their periphery, in which the water may flow upward past the chambers. This form
 45 and proportion of the parts gives great efficiency as well as elastic yielding of the expansion and contraction.

The steam-pipes N' N² may be connected respectively to the top and bottom disks M by insertion through the sides of the body, with
 55 proper means for making a tight joint; but I prefer the arrangement shown, in which they are respectively inserted through the ends, and there are some advantages in so doing. I employ two short gas-pipe tubes with screws cut
 60 the whole length. These tubes are inserted into the disks at each end of the series and a nut and india-rubber packing set on each. Then the heads of the vessel are applied, and an-

other rubber packing and nut, N³, which is 65 similar to those used inside the vessel A, is screwed down firmly on the outside of each head. The steam and return pipes are then connected to the short tubes by a right-and-left coupling or a union-joint. In order to take
 70 off the heads it is only necessary to disconnect the pipes, which is easily done, and take off the outside nuts.

Modifications may be made in many or all the details, some of which have been above 75 suggested, and others will readily occur to good mechanics.

Suitable apparatus may be applied to regulate either the admission of the steam through the pipe N' or the discharge of water of con- 80 densation through the pipe N², or to limit the circulation of the water in the pipes P Q R. The regulation may be adjusted by hand or be made automatic, varying with the pressure of the steam, the temperature of the water, or the 85 temperature of the air in the apartment. I can use any ordinary or suitable means for attaining these ends. In green-houses the regulator should be in the coldest portion.

Parts of my invention may be used without 90 the others. I can use the peculiar construction of the steam-passage M *m* with advantage in connection with any ordinary or suitable arrangement of radiating-pipes.

I claim as my invention— 95

1. In an apparatus for heating by water, the steam-passage M *m* M *m*, constructed as shown, in combination with the rigidly-mounted pipes N' N², water-vessel A, and a series of connecting-pipes attached near the top and bottom of 100 the water-vessel for radiating heat from water circulated in the apparatus, as herein specified.

2. In combination with the upright vessel A, steam-pipes N' N², provisions M *m* for imparting heat from the steam to the water and 105 allowing for changes of temperature, the out-flowing-water pipes P, arranged horizontally in a series of two or more, side by side, connection Q, and return water-pipes R, also placed horizontally, all arranged for joint operation, 110 as herein specified.

3. In an apparatus for heating buildings by hot water, the expansion box or vessel Q' and connecting-pipe Q, in combination with the two series of horizontal pipes P R, and with the up- 115 right vessel A and means, substantially as described, for rapidly heating the water in the latter, all arranged for joint operation, as and for the purposes herein specified.

In testimony whereof I have hereunto set 120 my hand, at St. Johnsbury, Vermont, this 6th day of August, 1880, in the presence of two subscribing witnesses.

THADDEUS FAIRBANKS.

Witnesses:

E. D. BLODGETT,
 HENRY FAIRBANKS.