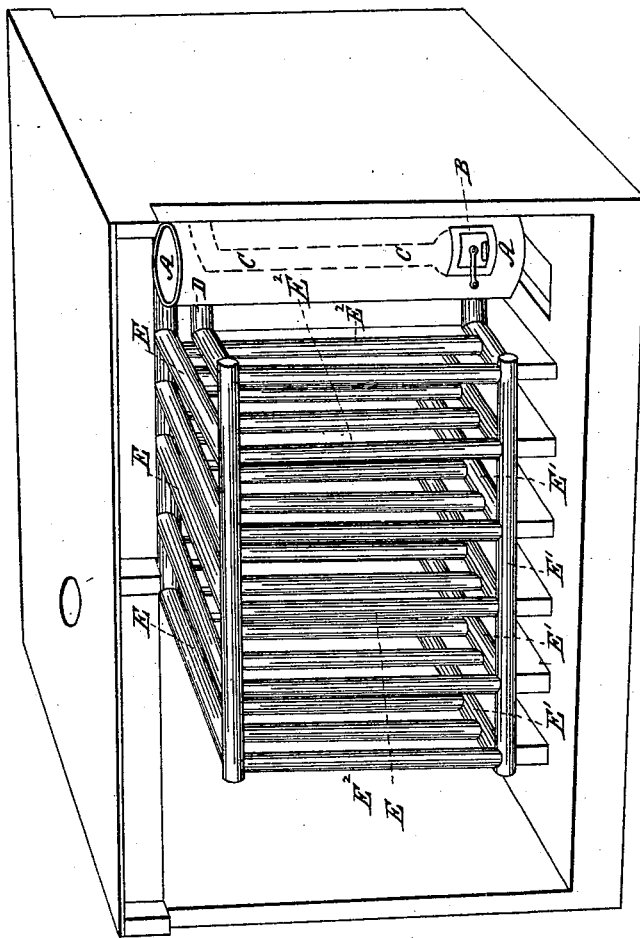


G. M. DEXTER.
Steam Heater.

No. 1,875.

Patented Dec. 1, 1840.



UNITED STATES PATENT OFFICE.

GEORGE M. DEXTER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN THE MODE OF HEATING BUILDINGS BY MEANS OF AN APPARATUS CONSISTING OF TUBES FOR THE CIRCULATION OF HOT WATER ARRANGED IN AN AIR-CHAMBER ADAPTED TO THE SAME.

Specification forming part of Letters Patent No. 1,875, dated December 1, 1840.

To all whom it may concern:

Be it known that I, GEORGE M. DEXTER, of the city of Boston, in the State of Massachusetts, have invented a new and improved manner of constructing an apparatus for the warming of dwelling-houses and other buildings by the circulation of heated water through suitable circulating pipes or tubes contained within an air-chamber for heating said air, whence the heated air is to be conveyed to other apartments or within which it may be applied to various useful purposes, said improvement being specially applicable wherever a degree of artificial heat below that of boiling water is required or sufficient—such, for example, as in the drying-rooms of laundries, bleacheries, manufactories of paper, gunpowder, and many other articles; and I do hereby declare that the following is a full and exact description thereof.

My apparatus for heating the water consists of a vertical cylindrical or other formed heating vessel or tank standing in position like the vertical cylindrical boiler of a steam-engine; but as it is not intended to raise the water contained in it to the boiling-point it is left open at top, the quantity evaporated not being greater than it is in general desirable to diffuse in the atmosphere.

The furnace or fire-place of my heating-vessel is usually so constructed as to be surrounded by water on all sides, excepting at the feed-hole for the introduction of fuel and at the grate above the ash-pit. The pipe or flue from the furnace I carry up through the water in my heating-vessel, by which means the heat from the fire is more effectually communicated to it and fuel is economized. This pipe may then lead off the smoke laterally or otherwise into a flue or chimney. In this part of the structure I am aware that there is not anything new, a similar arrangement having been made in various boilers for generating steam; nor do I intend to limit myself to this particular manner of constructing my furnace and heating apparatus, as these may be varied to a considerable extent and the same end be obtained.

My heating-vessel is to be made to vary in its dimensions according to the service it is intended to perform. Its height, however,

will usually be from ten to twelve feet, more or less. In order to convey the heat from this heating-vessel into the air-heating chamber or apartment within which air is to be warmed, a pipe is made to lead off horizontally from its lower end and another from its upper end; but the latter pipe must always be kept entirely below the surface of the water. When these pipes reach the air-heating chamber or apartment within which air is to be heated, they are to be connected with each other in such a manner as that the water which flows from the heating-vessel through the upper pipe shall be reconveyed into said vessel through the lower pipe, thus constituting what I denominate the "circulating-pipe." The connection between the upper and lower pipes of this system may be made to assume various forms, according to circumstances, the object being in all cases to expose a large surface of pipe in the air-heating chamber or apartment, in order that as great a portion as possible of the heat may pass into it from the heated water by radiation. This circulating-pipe may be coiled around the apartment, or a frame-work of pipes may be formed horizontally at the level of the upper and lower pipes leading from and into the heating-vessel, and these horizontal pipes may be connected together by others placed vertically and passing into them. The circulating pipes or tubes may be flattened, so as to assume the form of shelves, tanks, or boxes to adapt them to any particular purpose. As there will not be any pressure of steam in these pipes or conduits, they will not require any greater strength than that which is requisite to sustain the weight of the water which is to flow through them.

The circulating-tubes used in this apparatus, when cylindrical, I make of large size—say four inches in diameter—and of copper, although the tubes or pipes of other metal may of course be employed.

When it is intended to warm and ventilate dwelling-houses or other buildings by means of this apparatus, the air-heating chamber may be constructed in any convenient situation on the lower floor to be heated. Within this air-heating chamber the extended surface of circulating-pipes is to be contained,

and into the lower part of this chamber air is to be allowed to enter through an opening or openings made for that purpose in the bottom or lower part thereof. This air will be warmed by the heat radiating from the pipes and may be conveyed through a suitable opening or openings in the upper part of the chamber wherever it may be required. It has been found in practice that the air thus heated in a suitable air-chamber will suffice to communicate a genial warmth, not only to the apartments on its own level, but to those above it, and that it is not necessary to have an array of tubes for its conveyance, the ordinary stairways performing this office to a great and often to a sufficient extent, and in all cases where openings are desired from one apartment to another trunks of considerable capacity—a foot and a half or more square—have been advantageously employed.

The accompanying drawing represents an air-heating chamber or a drying-room containing a frame-work of circulating-tubes serving to exemplify the manner in which they may be arranged. The top and a portion of the sides of the chamber are omitted for the purpose of showing its interior.

A A is the heating-vessel, placed contiguous to, or it may be within, the air-heating chamber.

B is the furnace-door, and the dotted line C C shows the flue passing up through the water.

D is the pipe leading from the upper part of the boiler to the frame-work of the tubes E E E E, and F is the return-tube leading into the lower part of the heating-vessel and reconveying the water into it after it has passed through the frame-work of tubes, or through tubes or conduits arranged in any other way which may be preferred.

E E are tubes constituting the upper and E' E' those constituting the lower horizontal portion, which two portions are shown as connected together by the vertical pipes E² E². This arrangement, when the apartment is used for a drying-room, will admit of the convenient placing of shelves or other devices between the vertical pipes. Clothes-horses properly formed may also be slid in between the rows of pipes.

My invention, as above described, differs materially from the various plans heretofore essayed for the heating of dwelling-houses and other buildings by the circulation of

heated water through tubes passing into and around the respective apartments to be heated, and which plans, owing to the want of ventilation, the space required, the difficulty of passing openings, such as doors, &c., and other objectionable features, have been generally abandoned. In my plan of warming the air is heated in one or more air-heating chambers, within which the circulating-tubes are situate, and it is allowed to pass thence through large openings already existing or made for the purpose, as herein fully set forth.

A drying and warming apparatus constructed and operating on the principles above described will be found to combine perfect safety with great economy, its economy resulting from the facility with which it is constructed and managed, and from the water not being heated to the point at which it boils under atmospheric pressure and the apparatus therefore not being subjected to the force of steam, the whole of the heat communicated from the fire to the water is consequently sensible or uncombined heat, thus avoiding the great loss usually encountered in steam apparatus by the almost unavoidable escape of steam. From the foregoing arrangement that portion of the sensible heat not given out by radiation from the circulating-pipes is returned to the heating-vessel, so that no part of it is wasted.

Having thus fully described the manner in which I construct, arrange, and combine my apparatus for warming and ventilating buildings, for heating drying-rooms in manufactories of various kinds, and for other purposes, what I claim therein as constituting my invention and improvement is—

The heating of air in a chamber constructed for that purpose, within which chamber there is a system of tubes, which tubes are heated by causing water to circulate through them in the manner set forth, said water being at a temperature below that of boiling and being supplied by a heating-vessel arranged and operating substantially in the manner described, and the air so heated being conveyed from the said air-heating chamber through large trunks or other openings into the apartments to be warmed, as herein fully made known.

G. M. DEXTER.

Witnesses:

THOMAS A. DEXTER,
JOHN CHADWICK.