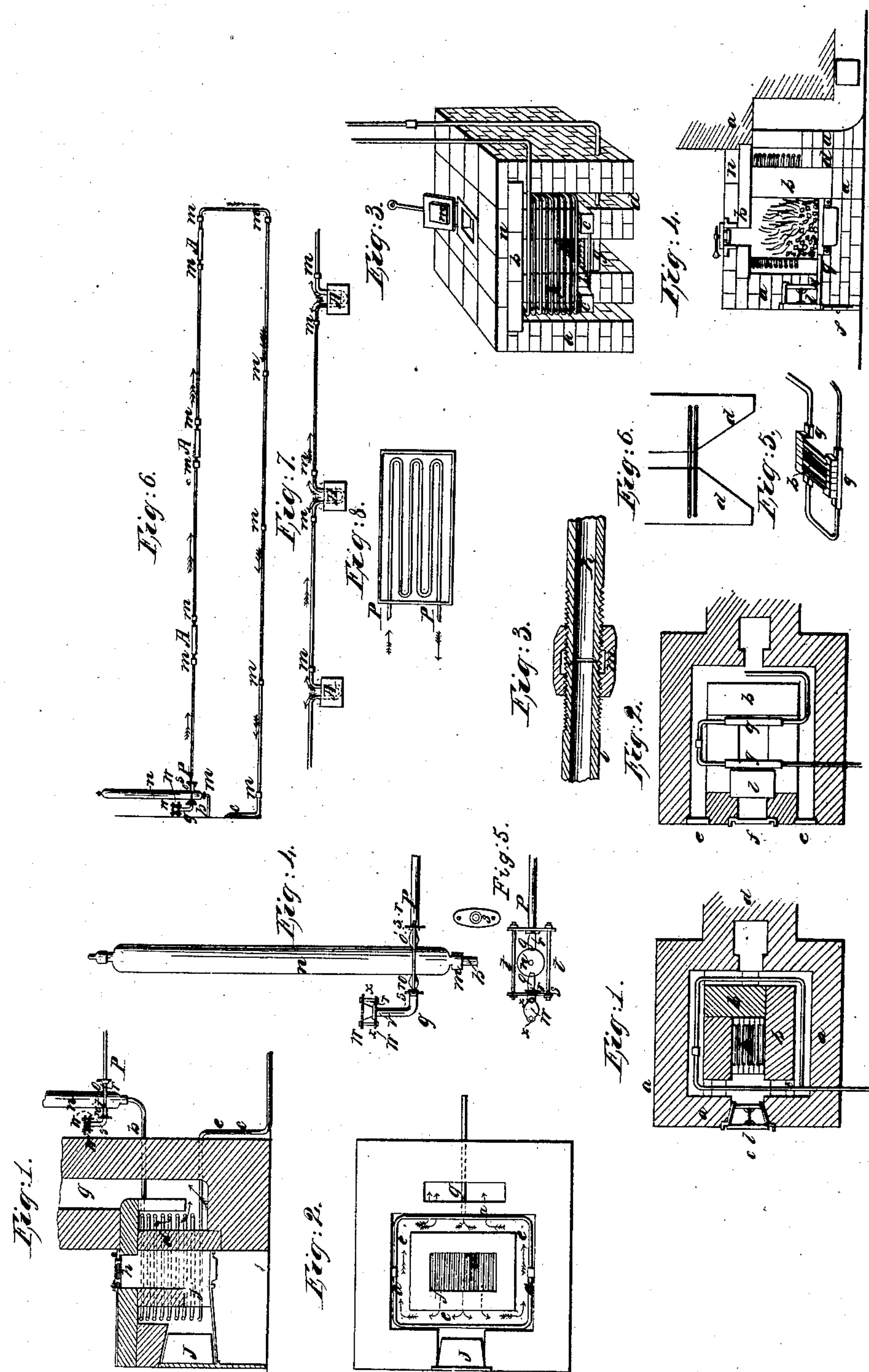
A. M. Perkins,

Steam Heater.

No 888. Patented Aug. 20, 1838.



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UNITED STATES PATENT OFFICE.

ANGIER M. PERKINS, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF TO MERRITT MOORE ROBINSON.

MODE OF HEATING BUILDINGS AND EVAPORATING FLUIDS.

Specification of Letters Patent No. 888, dated August 20, 1838.

To all whom it may concern:

Be it known that I, ANGIER MARCH PERKINS, formerly of Newburyport, in the State of Massachusetts, in the United States of America, but now residing in Great Coram street, London, in the county of Middlesex, in the Kingdom of Great Britain, engineer, have invented certain improvements in apparatus for heating buildings by the circulation of heated water or any other fluid or fluid metal through metallic tubes, and which invention is applicable also to other purposes; and I, the said ANGIER MARCH PERKINS, do declare the nature of my said invention and the manner in which the same is to be performed are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed and to the figures and letters marked thereon—that is to say:

My invention relates to that description of apparatus or method of heating which is now largely employed in heating buildings and for other purposes by the circulation of hot water or any other fluid or fluid metal; and the object of my improvements thereon is to obtain considerably higher degrees of temperature in the water or other fluid or fluid metal circulated and thus I am enabled to apply my apparatus to a variety of purposes which require the heating medium to be at a higher degree of temperature than that of boiling water. And my improvements consist in circulating water or any other fluid or fluid metal in tubes or pipes which are closed in all parts allowing a sufficient space for the expansion of the water or other fluid or fluid metal contained within the apparatus by which means the water or other fluid or fluid metal will at all times be kept in contact with the metal however high the degree of heat such apparatus may be submitted to and yet at the same time there will be no danger of bursting the apparatus in consequence of the water or other fluid or fluid metal having sufficient space to expand. But in order that my invention may be fully understood and carried into effect I will now describe the drawings hereunto annexed which represent the improvements applied in various ways.

Description of the drawings—Plan A.—Figure 1, shows the section of the description of furnace I prefer and Fig. 2, is a plan also in section.

In each of these figures the same letters of reference indicate similar parts and such is the case in the other figures in the drawings.

The description of tubes which I have used and find to answer are what are called drawn gas tubing and the size I most commonly employ is about one inch outside diameter and the diameter of the inner area is about $\frac{5}{8}$ of an inch but I do not confine myself to the use of this size tubing.

In Figs. 1 and 2, *a*, *a*, *a*, is a coil of tubing which is placed within the furnace as shown in the drawing, *b* is a tube by which the water or other fluid or fluid metal passes from the coil *a* when in a heated state, and *c* is the tube by which the water or other fluid or fluid metal is returned to the coil after giving off the heat to effect the object for which the apparatus is applied whether for heating the air in buildings evaporating fluids or heating metal as will be more fully described hereafter.

The furnace consists of two compartments *d* and *e*, the compartment *d* is that in which the fuel is burned and the compartment *e* surrounds that at *d* and is a sort of hot chamber in which the coil of tubes *a* is placed and the water or other fluid or fluid metal therein becomes heated by the heat which is generated in the compartment *d* the smoke and heated air passing from the ignited fuel at *f* into the compartment *e* and thence passes into the chimney *g*.

The description of fuel which I prefer is coke or stone or other coal as free from bituminous matter as possible, which is put into the compartment *d* at the upper part at *h* over which there is placed at all times a cover to prevent any draft in that direction by which means when the fire is lighted and the fuel is filled up to the top of the compartment *d* and the opening at *h* covered the air which produces the combustion will pass up through the fire bars at *i* and the fuel on such bars will in a short time become an ignited mass. *j* is an opening or door in the front of the furnace by which the same may be stoked or the fire lighted.

Figs. 3, 4 and 5 show the manner in which I construct the joints of the apparatus which are shown on a larger scale for the purpose of making them more clear. Fig. 3, shows in section the manner of connecting two tubes k and l. It will be seen that the end of the tube k is tapered off both inside and out to a sharp edge which buts against the straight surface of the end of the tube l. On the ends of these tubes are cut screws the one having a right hand screw the other a left hand screw and by means of the coupling piece m which has a female screw cut right and left the two ends of the tubes k and l are brought together and by this means a strong water tight joint is made and in this manner I connect any number of tubes together according to the purpose to which the apparatus is to be applied.

Figs. 4 and 5, are two views of the connection of other parts of the apparatus and also of the part of the apparatus intended for the expansion of the water or other fluid or fluid metal. n is an upright tube closed at the top having a small screw hole to let out the air when the apparatus is filled with water or other fluid or fluid metal but which is kept perfectly closed when the air is driven out. This tube n is usually made of a larger size than those in which the circulation takes place and in this tube there should be an area equal to the quantity of expansion which will take place in the water or other fluid or fluid metal contained in the other tubes and as water expands to about one twentieth without being converted into steam I have at least double that quantity of capacity in the tube or vessel n. o, o, are two short tubes formed with cones at their two ends. These cones enter into holes perforated in the tube n and into the ends of the tubes p and q the tube p being the one by which the hot water or other fluid or fluid metal is conveyed from the coil a after it has become heated and the tube or pipe q is the point at which the apparatus is filled with water or other fluid or fluid metal and by which the height of the water or other fluid or fluid metal is regulated and this tube q is to be placed in such a position that there shall be sufficient space above it in the tube n to allow for expansion.

On the tubes p and q are two collars r formed and by means of the two plates s, s, and the screw bolts and nuts t, t there will be a strong water tight joint formed to all the parts. At the top v of the pipe there is a collar r formed and by the plates w and the screws and nuts x the cone y is strongly held in the opening of the tube q by which the same is made water tight when the apparatus has been filled with water or other fluid or fluid metal. To the bottom of the expansion tube n is connected the pipe b by similar coupling to that described in Fig. 3.

Having now described the manner in which I conceive it best to construct the various parts of the apparatus I proceed to explain some applications of the same.

Fig. 6, shows a longitudinal view and Fig. 7 shows a plan of an arrangement for applying my improvements to hot plates which are intended to be used by copper plate and other printers for the purpose of heating the plates from which impressions are to be taken. I have not thought it necessary to show the presses or any other parts of the machinery used for printing. The plates A A being intended to be used in place of the charcoal fire grates heretofore employed for heating the plates at the time the ink is being rubbed on. One of these plates A is placed in the proper position at each press if more than one is to be heated and it will be evident that a large number of presses may have their plates A heated by one set of tubes.

The tube p is the one which as above described conveys the heated water or other fluid or fluid metal from the furnace and the tube c returns it back to the coil after it has given off its heat. The manner in which I construct the plates A is as follows: I make a rectangular mold to the size required, and place therein the bent part of the tube p and then fill the mold with melted lead or other metal according to the degrees of heat such plates are intended to bear by which means I produce metal surfaces which become heated by the passage of the heated water or other fluid or fluid metal through the tubes p and it is evident that such heated plates may be applied in a variety of ways and for a variety of purposes such for instance as hot plates for cooking purposes.

Fig. 8 shows the manner of applying the apparatus to a rectangular boiler which boiler is shown in plan and is applicable to the boiling of syrup in making or refining sugar by which it will be seen the heated water or other fluid or fluid metal is made to circulate through a series of tubes and give off its heat to the fluid contained in the boiler or these tubes may be made to pass into steam or other boilers in a similar manner and will cause the fluid contained in such boiler to become heated and evaporated.

In heating the air of rooms in buildings the tubes p and c may be made to pass around the flooring of each room and where a large quantity of heat is desired it will sometimes be desirable to have more than one pipe passing to and from the coil of pipes contained in the furnace whereby a larger quantity of heated surface will be presented which being heated to a high degree of temperature will give off the same to the air contained in the room or buildings and warm the same, and I have found that when the circulating tubes present a surface equal to three times that of the coil of tubes in the furnace I have not been able to burst the tubes.

Having now described the nature of my

invention and the manner of carrying the same into effect, I would have it understood that I lay no claim to the various parts of which such apparatus is composed, neither do I claim the application of the circulation of hot water or other fluid or fluid metal to the purposes above described; but what I claim as my improvements in such apparatus or method for heating the air in buildings heating and evaporating fluids and heating metal consists in circulating water or any other fluid or fluid metal in tubes or pipes closed in all parts and having sufficient space allowed for the expansion of the water or other fluid or fluid metal as above described.

To make the construction of the furnaces more perfectly intelligible I must refer to drawing B in which I have given other views of the furnace which I chiefly use. The forms and dimensions of the furnaces belonging to the apparatus necessarily vary according to the localities of the place where they are erected and to the quantity of work required of them. Under common circumstances the size is about three feet six inches square increasing to six feet according to the extent of pipe connected with it. The furnace in drawing B is four feet six inches square and is considered a powerful one, the fire occupies a small space in the center raised about one foot from the ground and the fuel is supplied from the hopper door at the top.

An inspection of the drawing B will best explain the construction. Figure 1 is a plan of furnace above the grate. Fig. 2, plan below the grate. Fig. 3, a section on the line *a b* (Fig. 1) and Fig. 4, section on the line *c d; a, a, a*, common brick work; *b, b, b*, Welsh fire lumps; *c c c* fire bricks supporting coil; *d, d* the wells or reservoirs for the dust and soot which would otherwise clog the coil; *e e* doors for clearing out the dust, &c.; *f*, ash-pit door; *g*, bearing bars for grate; *h*, the grate; *i*, an iron plate for separating the ash-pit from the tubes; *k*, tubes forming coil; *l*, double fire-door for clearing out the scoria or clinkers; *m*, the hopper door; *n* Welsh tile or other suitable covering. Fig. 5 shows the descending tube entering the chamber passing through the bearing bars of the grate. Fig. 6, is a section of the back well or reservoir formed so as to support the coil and to cause the soot and dust to fall to the bottom so as to be cleared out from the doors *e e*. It will be seen from the above description that the ignited coal is surrounded on three sides by a thickness of nine inch fire brick or Welsh lumps and that the hopper door over the fire is likewise placed in one; around the fire brick is a chamber four and a half inches wide containing the coil of pipes; the pipe enters this chamber passing through the bearing bars of the grate which tends to preserve the grate from burning; the pipe when it proceeds in its course into the building to be warmed passes out at the upper part of the chamber. The outer case is of brick work nine inches thick and the whole is covered with Welsh lump and tile. The smoke leaving the ignited materials passes through the chamber containing the pipes escaping through the opening at the back.

The meaning of thus surrounding the fire with a thickness of fire brick (a good non-conductor of heat) is to prevent the too rapid abstraction of heat by the coils in the chamber, the coil only comes into contact with the fire at the opening in front where the smoke leaves the ignited embers.

This construction of furnace is the best calculated to preserve equality of heat and to obtain the greatest effect from any given quantity of fuel, the heat generated is rapidly absorbed by the water or other fluid or fluid metal ascending through the pipes and transmitted to the building.

ANGIER MARCH PERKINS.

Witnesses:

WILLIAM HEATH,

JOHN DUGGAN.