No. 787,617. PATENTED APR. 18, 1905.

Q. N. EVANS.

HEATING SYSTEM.

APPLICATION FILED DEC. 26, 1903.

2 SHEETS—SHEET 1.

FIG. 1.

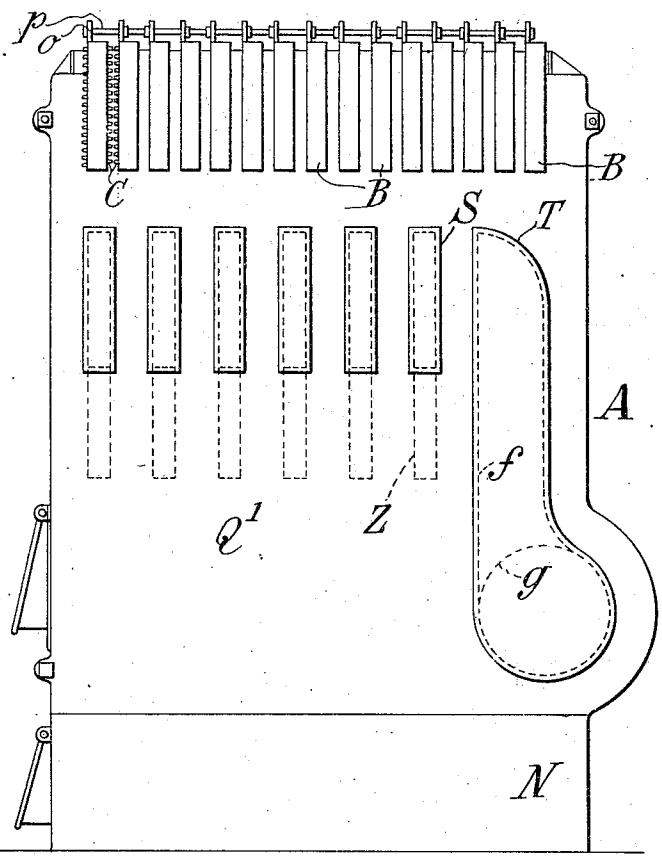
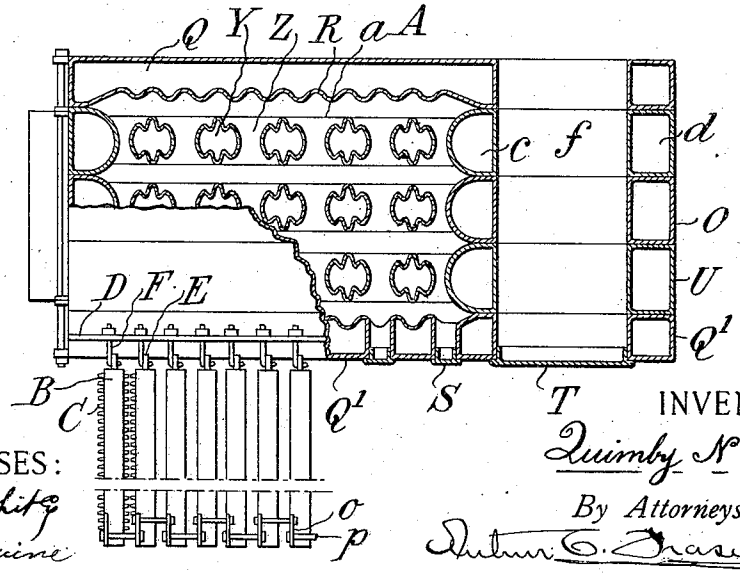


FIG. 2.



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2 SHEETS—SHEET 2.

FIG. 4.

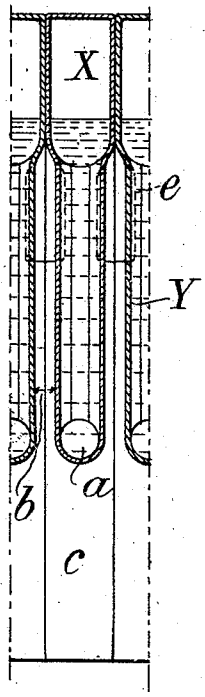


FIG. 3.

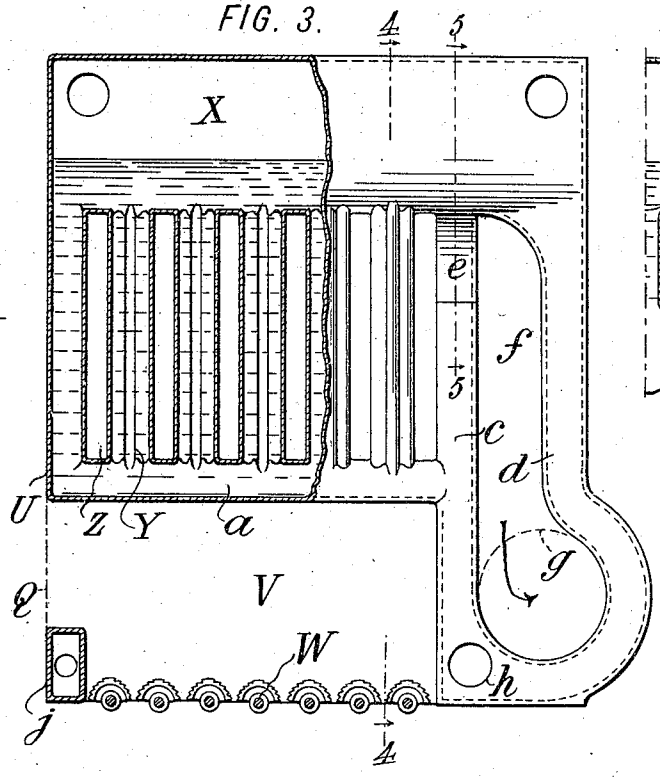


FIG. 5.

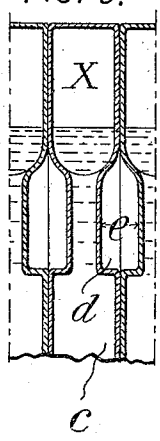


FIG. 6.

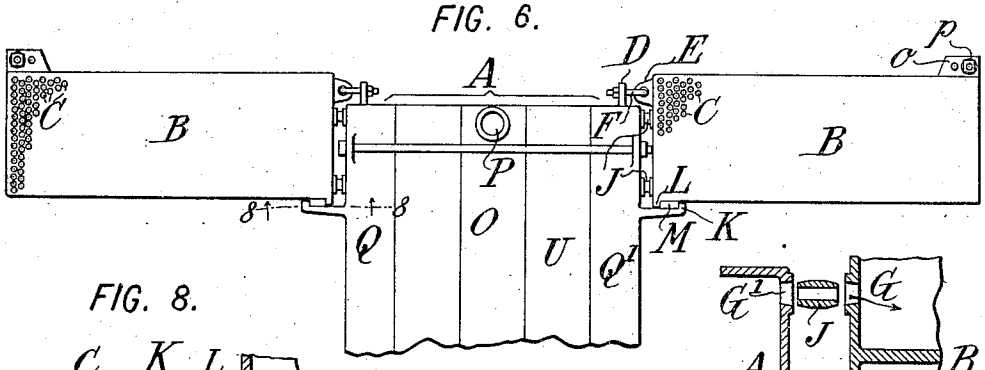


FIG. 8.

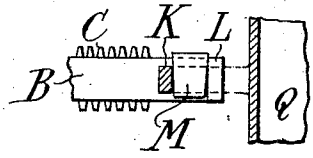


FIG. 9.

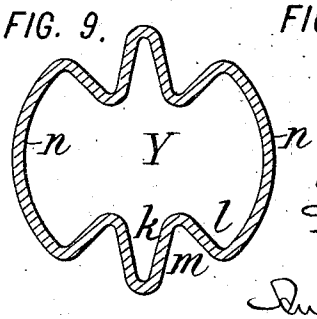
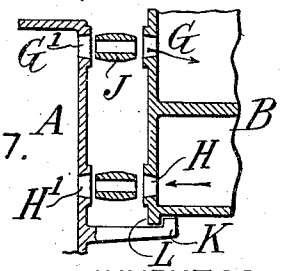


FIG. 7.



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No. 787,617. Patented April 18, 1905.

UNITED STATES PATENT OFFICE.

QUIMBY N. EVANS, OF NEW YORK, N. Y.

HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 787,617, dated April 18, 1905.

Application filed December 26, 1903. Serial No. 186,722.

To all whom it may concern:

Be it known that I, QUIMBY N. EVANS, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Heating Systems, of which the following is a specification.

This invention aims to provide certain improvements in heating systems and applicable especially to indirect radiator systems in which hot water or steam is circulated through radiators and the air to be used in heating the rooms passes over these radiators and thence into the rooms. An important point of improvement is the attaching of the heater (usually a boiler operating by steam in modern plants) and the radiators directly together, so that the two form substantially one compact structure, which saves a good deal of space and a good deal of the labor involved in setting up the plant. Ordinarily the radiators will be so small as compared with the boiler that they will be supported by the boiler at the top of one or both sides thereof. Preferably the inlet and discharge ports of each radiator are in direct communication with the boiler, so that the steam passes directly from the boiler into each radiator and directly from each radiator into the boiler, an immediate communication (without the interposition of any piping) being also preferred. The connections are designed to be very easily made, and my improved combined boiler and radiator may be erected at a minimum cost for labor and materials. It is also most efficient in that there is no heat lost in transmission from the boiler to the radiators, the radiators being in such close communication as to constitute almost parts of the steam-space of the boiler itself.

Various improvements in the detailed construction of the boiler are provided, whereby a high efficiency is obtained and whereby especially the cost of installing is reduced to a minimum. These improvements, however, are not separately claimed in this application, being claimed in my application, Serial No. 194,103, filed February 17, 1904, (Patent No. 782,737, dated February 14, 1905.)

Various other improvements are referred to hereinafter in detail.

The accompanying drawings illustrate an embodiment of the invention.

Figure 1 is a side view of a complete boiler with radiators attached. Fig. 2 is a horizontal view, partly in section and partly in plan, of Fig. 1. Fig. 3 is in part a longitudinal section and in part a side elevation of one of the sections of the boiler. Fig. 4 is a section on the line 4 4 of Fig. 3, showing adjacent boiler-sections in position. Fig. 5 is a similar section on the line 5 5 of Fig. 3. Fig. 6 is a front view of the upper end of the boiler with the radiators attached. Figs. 7 and 8 are details of connections. Fig. 9 is a cross-section of one of the tubes of the boiler.

Referring to the illustrated embodiment of the invention, A indicates the boiler as a whole, and B a series of radiators attached edgewise and preferably with their greatest length horizontal to the upper part of each side of the boiler. As shown in Figs. 1 and 6, radiators may be arranged throughout the length of each side of the boiler, or a smaller number of radiators may be provided, if desired, extending along only one side of the boiler or extending in part along each side. The radiators shown are preferably of the type known as "pin-radiators," having upon each face a number of pins C to increase the heating-surface. These pins are only shown in part, the construction being well known. The connections of the radiators with the boiler are preferably located on the edge of each radiator, so that the radiators may be placed close together, almost with the ends of their pins in contact, as shown by Figs. 1 and 2, so that all the air passing between the adjacent radiators shall be well heated.

A suitable manner of making the connections is indicated in detail in Figs. 6, 7, and 8. A rib D runs along the top of the boiler near one side edge, and each radiator is provided with an apertured lug E. A hook-bolt F engages the lug E and passes through the rib D and carries a nut which adjusts and holds it in place. Each radiator is formed with an inlet-port G and outlet-port H, preferably

tapered, as shown, and the boiler A is provided with corresponding ports G′ and H′. Slip or drive nipples J enter the registering openings tightly by merely driving or forcing the radiator against the boiler. This construction is well understood in the art. It will be noticed that the radiators being suspended by the hook F bring their weight to bear to make the connections J tight. I may, however, use an additional means for forcing and holding the radiators against the boiler, comprising a projection K from the side of the boiler and a complementary projection L on the edge of the radiator, with a wedge M forced between them to press the lower end of the radiator inward, as well as the upper end. Fig. 8 is an under side plan view of this construction, showing a portion of the projection K in dotted lines.

The boiler is preferably constructed in a series of longitudinal sections, five being shown in the present case, these being united by slip-nipples similar to those shown in Fig. 8 or being connected together in any other suitable manner. When so connected, they rest upon an ash-pit N. The middle section O may be the same as the other intermediate sections, though it preferably differs therefrom in having an aperture P for connection to a steam-heating system or for any other use of steam outside of the radiators B. The two outer sections Q differ from the intermediate sections in being formed with the means for connection to the radiators and for communication therewith, and they are also of different construction internally, being preferably of the substantially box-shape indicated in Fig. 2, with an internal corrugated wall R, forming a chamber of slightly less width at the intermediate portion than at the ends, where it is to be connected to the adjacent intermediate sections of the boiler. One of the side sections Q′ is also preferably provided with doors S, giving access to spaces or smoke-flues extending transversely across the boiler in a manner hereinafter described. Preferably the same side section Q′ of the boiler is provided with a larger door T, giving access to another smoke-flue, hereinafter described. The central section O and the other intermediate sections U are constructed as shown in Figs. 3, 4, and 5. The lower portion is entirely open to provide a furnace-chamber V. The grate-bars W are shown in order to indicate their position, though they form no part of the boiler-section. Each section is provided with an upper chamber X and with a series of vertical tubes Y, depending therefrom and spaced apart by transverse spaces Z, a continuous horizontal tube *a* being in communication with the lower end of each of said vertical tubes. The tubes Y and *a* are of less width than that of the ends and top of the section, so that when the sections are arranged alongside of each other there are spaces *b* between the tubes, constituting vertical passages for the smoke and other products of combustion. The transverse passages Y between the vertical tubes also facilitate the distribution of the heated gases throughout the boiler. At the rear end of each section are a pair of tubes or water-legs *c d*. The legs *d* are of the full width of the section throughout their length, while the legs *c* are reduced in width at their upper ends, as indicated in Fig. 5, to form longitudinal passages *e*, through which the smoke passes to the final transverse passage *f* at the rear of the boiler. The flue or passage *f* extends downward to approximately the bottom of the section, being surrounded throughout its length by the water-legs *c d*, which are united at the bottom. The smoke is withdrawn from the lower end of the flue *f*, the dotted line *g* indicating approximately the position of the flue leading to the stack and into which the smoke is passed from the flue *f*. The sections may be united by slip-nipples fitting into the openings *h* or by bolts or other suitable means. The outer sections Q, it will be understood, extend continuously to the bottom, so as to form the sides of the furnace. They are united at the front by a tubular member *j* extending across the boiler. The doors S and T register with the transverse passages Z and *f*, respectively, so that the boiler can be kept entirely clean with very little trouble.

The tubes Y may be of any suitable form. Preferably the shape shown in cross-section in Fig. 9 is used, the section being uniform throughout its length. The wall of the tube is so corrugated that it forms inside angles *k l* and outside angles *m*, which are quite deep, so as to give an extensive heating-surface, and which are of considerable width at their open ends, so as to facilitate the casting of the tubes and the withdrawal of the sand. Two of the opposite quadrants *n n* are curved outwardly substantially in a circular arc, the intermediate quadrants being deeply corrugated in the manner explained.

The boiler will ordinarily be filled with water to about the level indicated in Figs. 3, 4, and 5. The smoke passes up between the sections in the spaces *b*, and transversely through the spaces Z, and finally through the passage *e* into the rear flue *f*. The steam from the upper part of the boiler passes into the radiators B through the openings G and after circulating therein in any suitable manner is discharged through the openings H back into the boiler. The air for heating the rooms passes or is forced up through and about the radiators B and is heated by contact with the numerous pins C, providing a large heating-surface. The boiler can be extended or diminished in size by adding or taking away any number of intermediate sections. The attachment of the radiators to the outer sections facilitates this adjustability of the capacity of the system.

The radiators may be tied together at their outer ends by means of flanges *o* and bolts *p*.

When the boiler is used without the radiators or with radiators communicating therewith in some other manner than that shown, the side sections Q and Q′ may be cast without the ports G′ and H′ and without the rib D and projections K.

The provision of a horizontal tube *a* communicating with the lower ends of the vertical tubes Y insures a very good circulation of the water within the boiler. Furthermore, it avoids the dead ends which would otherwise exist and in which in previous constructions dirt has been found to accumulate in considerable quantities. With the horizontal tubes A the dirt may be very readily blown out.

The greatest value of the invention is in the avoidance of the extreme delays and expense involved in the use of manual labor of steam-fitters in erecting the plant, this advantage being due largely to the special radiator B which I have invented, consisting of the usual integral cast-iron box with an internal partition, as indicated in Fig. 7, having the ports G and H so placed as to permit a straight and immediate connection with the boiler. No piping or steam-fitting of any kind is required such as would be necessary with the old-style radiators having their ports arranged otherwise than the ports G and H on the same edge of my improved radiator B and in the direct line to the boiler. The fact that the nipples or other communications between the radiator and the boiler do not carry any of the weight of the radiator, independent supports being provided for this purpose, is also of great advantage in reducing the amount of skilled labor required in erecting the radiators.

Though I have described with great particularity of detail a complete embodiment of my invention, yet it is not to be understood that the invention is limited to the particular embodiment described. Various modifications thereof in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention.

What I claim is—

1. The combination with a heater, of a series of flat radiators arranged in vertical planes alongside said heater, projecting laterally therefrom and communicating therewith, and means independent of the communications between the heater and radiators for supporting each of the radiators separately from the heater.

2. The combination with a heater, of a radiator communicating therewith and having a lug E at the upper end of one edge, a rib D on the top of the boiler, and a connecting member between the rib D and lug E for supporting the radiator from the boiler.

3. The combination with a heater, of a radiator, said heater and said radiator having communicating ports, and means at the top and bottom of the radiator and independent of the communications between said ports for holding the radiator to the side wall of said heater.

4. The combination with a heater having a projection, of a radiator having a complementary projection, and a wedge, the projections being so positioned that the wedge may be forced between them to force the radiator toward the heater.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

QUIMBY N. EVANS.

Witnesses:
DOMINGO A. USINA,
FRED WHITE.