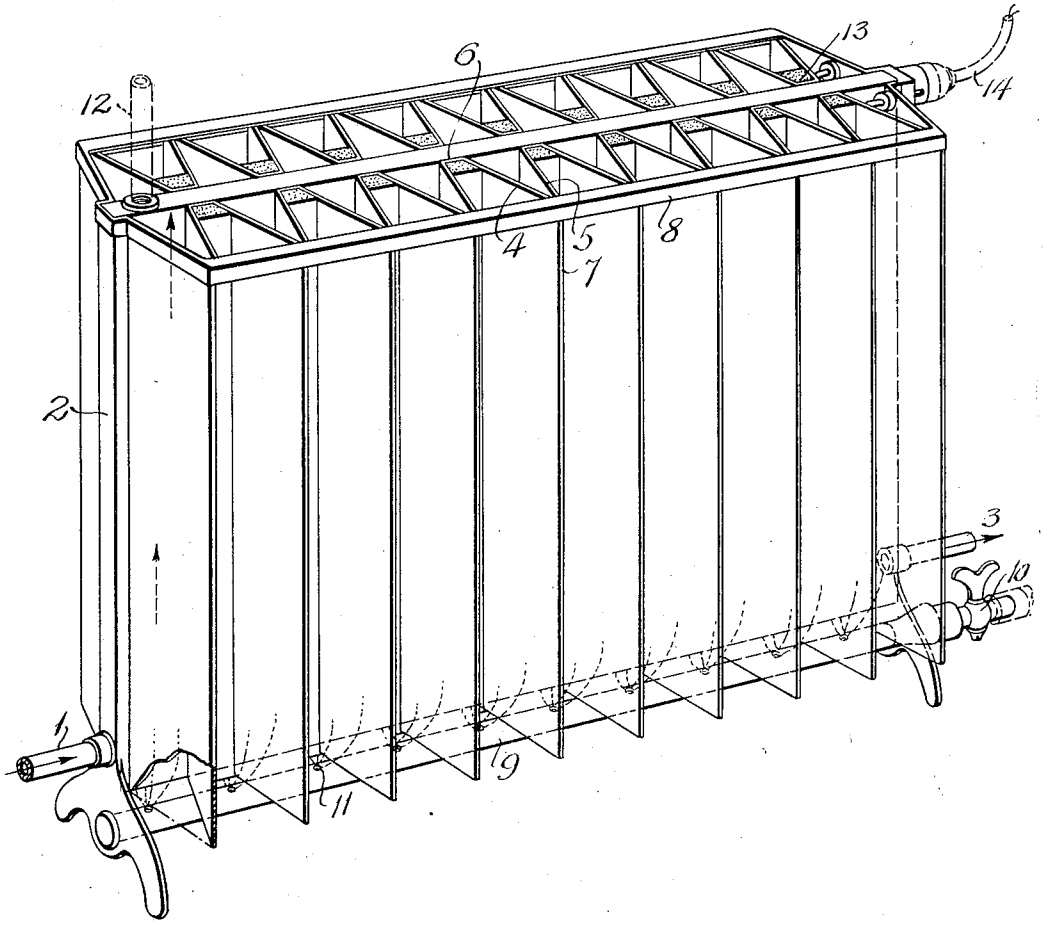
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RADIATOR

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By his Attorney

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UNITED STATES PATENT OFFICE.

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RADIATOR.

Application filed September 9, 1924. Serial No. 736,793.

The invention aims to provide a radiator having considerable advantages in economy and efficiency and adapted to be heated from various sources. The single figure of the drawing is a perspective view, partly in section, illustrating the invention as applied to a design of radiator described in my application No. 188,890, filed May 5, 1927 as a substitute for a previous application No. 725,559, filed July 12, 1924.

Referring to the embodiment of the invention illustrated, an admission pipe 1 admits steam or other heating medium to a long, narrow rectangular chamber 2 in which it gives up its heat or a considerable portion thereof and from which it passes out by the outlet pipe 3.

The sides of the chamber are engaged by a radiating structure of plates extending laterally outward. The radiating plates at one side of the chamber are preferably made from a single continuous sheet bent to shape; and those on the opposite side from a similar sheet. Each sheet is thus formed into plates 4 and 5, separated at their inner edges to form triangular spaces or chimneys for the upward circulation of air. At their inner edges where they join the central chamber 2 there is a short plate 6 bearing against and preferably welded to the chamber so as to take the heat therefrom and conduct it outward through the parts 4 and 5. The plates 4 and 5 of each pair comes together at their outer edges 7, where they are braced by longitudinal braces 8, preferably in the form of angle bars embracing the corners of the radiating structure, and thus serving also to prevent accidental contact of a person with such corners. The radiating structure thus described differs in detail from that illustrated in my previous application but is substantially the same in operation.

It can be more economically constructed because of the utilization of a single sheet to form all the radiating members at either side of the central chamber, and it has certain advantages in providing for the convenient application of other heating means.

Extending immediately below the chamber 2 is a pipe 9 for gas or similar fuel admitted through a cock 10. The pipe or burner 9 has orifices 11, preferably at intervals corresponding to the points of the heating chamber which lie opposite the separated inner edges of the plates 4 and 5. Thus when the gas is ignited the flames will lie under the chamber 2 and in the lower ends of the triangular chimneys formed by the plates 4 and 5 and the sides of the chamber. For use with gas it is desirable that hot water be supplied to the chamber. The pipe 1 at the bottom and the pipe 12 at the top may be used for introducing and withdrawing such water or for permitting the escape of steam.

A third heating means is illustrated, consisting of coils 13 of resistant wire suitably insulated and mounted in the outside spaces between the plates 4 and 5. A cable 14 is illustrated for attachment to a socket to connect the electric heaters to the circuit.

I prefer to use for the heating chamber and for the radiating structure a metal of great heat conductivity, such as copper, brass or zinc, which are much superior to the ordinary metals, iron and steel. By using copper or brass in thin sheets I get a sufficient increase in efficiency to compensate for the increased cost per pound. For example, I may use plates of about one-sixty-fourth of an inch in thickness extending outward from one to six inches. The chamber 2 should be narrow, as indicated. Radiators of this design and of these materials and dimensions are particularly advantageous because they can be easily equipped with gas boilers and electric heaters in the manner indicated, and these heaters can be located so as to secure the best application of the heat to water carried in the chamber 2, the chamber being equally adapted for steam or hot water circulation. The electric heaters stiffen the entire structure against distortion, which is important with such thin sheet metal. It will be observed that the gas flames and the electric heaters are applied at alternate points along the side of the chamber. The gas flames come up through the chimneys formed by the sides of the chamber, while the electric heaters are in the angular spaces which are open to the outside. It is contemplated that the radiator shall be equipped with both these heating instrumentalities, as well as with couplings to which pipes may be attached for steam or hot water circulation. If any one of these methods does not give the required amount of heat, two, or even three, of them can be used at the same time, there being no interference between them.

An important feature of the invention is in the vertical extension of the transverse

plates formed by the corrugated structure. These plates extend to a great height relatively to their width so as to form heated vertical air ducts which are unimpeded throughout their height. That is to say, the electric heating elements are of the same cross section throughout their length, leaving the clear duct space between the transverse plates also of uniform section throughout their height. The cool air enters the lower ends and open side of these air ducts and rises between the walls formed by the plates in the form of a horizontal series of vertical columns of air which are progressively heated on both sides by prolonged contact with the heated walls of the ducts and are thus impelled rapidly upward so as to accelerate the circulation of the heated air columns upward from the ducts and throughout the room or inclosure to be heated.

The ducts between transverse plates which converge at their outer edges are in fact flues closed in cross-section and adapted to produce an even greater draft upward than the spaces between such flues; the draft being slower in the latter because of the admission of cool air at the open outer side of the duct. The action takes place either with or without water in the water chamber 2, the effect of water therein being merely to maintain a store of heat for a certain length of time after the electric current is cut off.

The ducts act in the same way when the heat is supplied from the fuel pipe or burner 9. This burner in fact constitutes a heating element located solely at the bottom of the ducts described; in contrast with the electric heating devices which are attached to the transverse plates not only at the lower portions of the latter, but throughout their height.

The result of this structure of vertical ducts is that instead of a relatively stationary or slowly rising and laterally diffusing overheated body of air around a heating element and underheated air in the remainder of the room or inclosure, there is obtained a greatly accelerated ascent of warm columns of air through the heated ducts and upward therefrom and thus a forced circulation and distribution of evenly heated air throughout the entire inclosure.

Specific claims for the electric heater are not presented in the present application, being covered in a co-pending divisional application No. 331,347, filed January 9, 1929.

Though I have described with great particularity of detail certain embodiments of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiment disclosed. Various modifications may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:

1. A combination heater and radiator including in combination a chamber for a fluid heating medium, a radiating structure comprising vertically extending plates mounted on the outer faces of said chamber and forming flues which are closed in cross section along the sides of the chamber, electric heaters in contact with the outside of the chamber between said flues and a gas burner below said chamber with orifices registering with said flues and alternating with said electric heaters along the length of the chamber.

2. A combination heater and radiator including in combination a chamber for a fluid heating medium having flat vertical sides, a radiating structure of plates engaging the sides of the chamber, extending laterally outward and forming with the chamber wall vertical flues which are closed in cross-section and spaced apart from one another, electric heaters located in the spaces between the flues and adjacent to the chamber, and a gas burner below the chamber with orifices registering with said flues and alternating with said electric heaters along the length of the chamber, so that the flames pass up the flues between the electric heaters and are separated from said heaters by the plates.

3. A combination heater and radiator including in combination a chamber for a fluid heating medium, a radiating structure comprising vertically extending plates mounted on the outer faces of said chamber and forming vertical flues along the sides of the chamber and a burner below the chamber with orifices registering with said flues.

4. A combination heater and radiator comprising a burner, a fluid chamber and a longitudinal series of transverse plates fixed in relation to said burner and chamber, said plates being substantially free of intervening obstructions and rising vertically from the burner to a height relatively great compared to their width, and forming a longitudinal series of unimpeded heated vertical air ducts.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.