

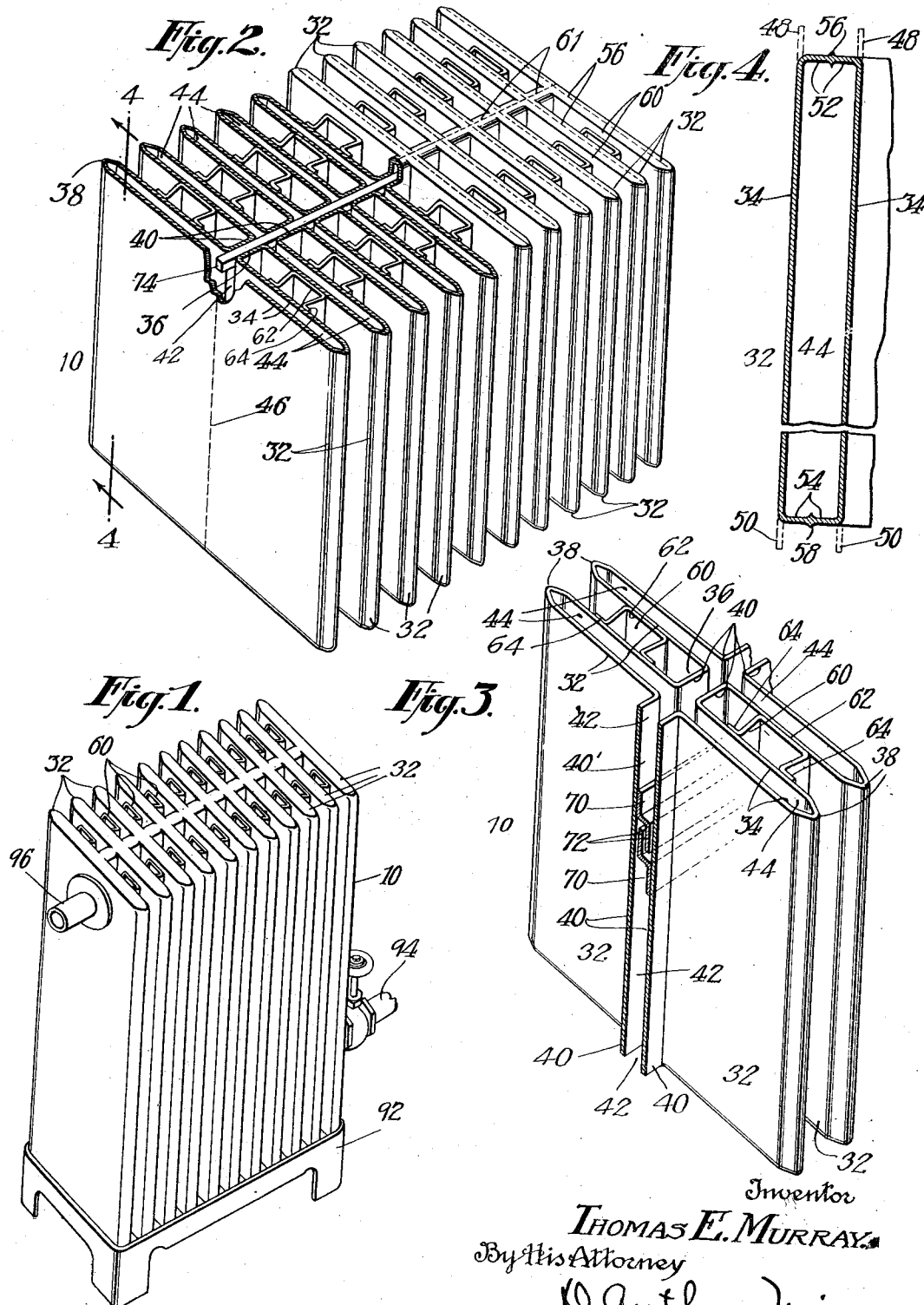
June 28, 1927.

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RADIATOR

1,633,601

Original Filed June 7, 1923



Inventor

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RADIATOR.

Original application filed June 7, 1923, Serial No. 643,941. Divided and this application filed February 5, 1924. Serial No. 690,685.

The invention relates to heating appliances and particularly to household radiators or radiator heaters of novel construction. The present invention is a division of application Serial No. 643,941 filed June 7, 1923. The invention contemplates the production of an improved radiator or household heater made preferably of sheet or plate metal bent to suitable shape so as to form a hollow structure through which a fluid such as steam or hot water can be circulated. A feature of the invention is to provide a construction by which the radiator can be formed of extremely thin metal so braced that the walls of the radiator will not be distorted by pressure or vacuum. The invention also contemplates providing a radiator whose inner walls are extremely smooth so that the heat conductivity of the radiator is increased over that of radiators heretofore used.

A further feature of the invention is to form the radiator of extremely thin metal which can be easily bent or shaped and so that the abutting edges of the cells of the radiator can be united by deposited metal, such as by soldering the joints, arc welding them or making an electrolytic deposit of metal along the joint.

Further features of the invention will be apparent from the following specification and will be pointed out with particularity in the appended claims. An embodiment of the invention is illustrated in the accompanying drawings in which

Fig. 1 is a perspective view of a small household radiator;

Fig. 2 is a detail perspective with parts shown in section showing the cellular structure of the radiator illustrated in Fig. 1;

Fig. 3 is an enlarged detail of parts shown in Fig. 2;

Fig. 4 is a detail section on line 4-4 of Fig. 2.

Referring in detail to the drawings the radiator comprises a member 10 preferably formed by bending or corrugating a short metal plate or plates to form a cellular structure such as shown in Figs. 2 and 3, com-

prising a series of hollow ribs 32 which include laterally extending walls 34 united at 36 and 38 near their inner and outer ends respectively.

As shown in Figs. 2 and 3 the unit 10 is formed so that the walls 40 which connect the adjacent hollow ribs are comparatively flat and are spaced laterally to form a longitudinally extending passage 42 communicating with the chambers 44 defined by the walls 34 of the hollow ribs.

The member 10 can be conveniently and inexpensively manufactured according to my improved design by bending a plate so as to form a series of hollow ribs which define chambers of comparatively small cross-sectional area and uniting the meeting ends of the plate thus bent by welding the same, or the meeting edges may be arc-welded, butt welded or welded by an oxyacetylene torch or the adjoining edges may be united by a deposited metal joint such as by soldering or electrolytically depositing metal along the line formed by the abutting edges of the walls. Instead of forming the structure of a single plate, I may, of course, use two plates in which case I would bend one sheet so as to form ribs extending outwardly from the center in one direction and would form a duplicate plate and assemble it so that its ribs extended outwardly in the opposite direction and in such case would join the end walls of the plate edges to each other.

After the plate or plates are bent to form the series of hollow ribs 32, the upper ends 48 and the lower ends 50 thereof are pressed or bent over as illustrated in Fig. 4 at 52 and 54 and the abutting edges are united as at 56 and 58 thus closing the ribs to form a fluid-tight structure. In a similar way the top and bottom edges of the walls 40 are pressed together and united as illustrated at 61 in Fig. 2.

The radiator is preferably made of extremely thin sheet metal. For example I propose to use metal ranging in thickness from one sixty-fourth of an inch up to approximately one sixteenth of an inch and for most commercial purposes will employ

a light gauge metal between these two extremes that is a metal having a thickness of about one thirty-second of an inch which corresponds to United States standard sheet metal gauge No. 22. The stock used will preferably be rolled metal having a smooth, polished or planished surface. I have found that by using a metal of such smooth or planished surface I can materially increase the heat conductivity of the radiator and thus produce a radiator of greater efficiency than those heretofore used largely because the heat is more rapidly conducted through the smooth thin metal walls and radiated to the surrounding atmosphere with my improved radiator than is possible with radiators heretofore made of cast or comparatively rough plate metal. Rolled copper is a metal particularly adapted for use in my improved radiator it being capable of conducting heat practically twice as fast as steel and also considerably faster than cast iron. With silver as a standard of conductivity assigned a value of one thousand, the conductivity of rolled copper is approximately eight hundred forty-five while the conductivity of steel is three hundred ninety-seven and cast iron three hundred fifty-nine. By making the inner surface of the walls of the radiator extremely smooth the conductivity is further raised. That is to say the smooth or planished surface of the given material will conduct the heat of the water or other fluid circulated in the radiator, to the outside or surrounding atmosphere much more rapidly than will a radiator formed of the same material and having comparatively rough or uneven surfaces.

When the hollow structure is subjected to internal pressure the tendency of such pressure is to distort or flex the sheet metal walls which it is understood are of comparatively light gauge stock. To counteract the effect of such pressure, I provide braces between the ribs on the outside of the structure and also certain braces or reinforcements within the structure. The braces within the structure are designed to prevent either an outward or inward distortion of the structure due either to pressure or vacuum, that is to say, the reinforcement which I provide will prevent either collapse or outward buckling.

The reinforcement used between the ribs is best shown in Figs. 2 and 3 and consists of channel or U-shaped members 60 each having a plate portion 62 secured to one of the walls 34 of the rib and flanges 64 secured to the opposing wall of an adjacent rib. The reinforcement 60 may be secured by either spot welding, arc welding or in any other suitable manner although arc welding is preferred. The members 60 also serve to increase the heat absorption or radiating surface of the structure and when the same

is used in a heater or boiler these members serve to prevent the escape of the products of combustion.

To prevent undue expansion or collapse of the hollow structure as above referred to, I secure Z bars 70 to the opposed walls 40, these bars being assembled so that their flanges 72 overlap. As thus arranged, it is apparent that such bars prevent any appreciable movement of the opposed walls either inwardly or outwardly. While I have only illustrated Z bars 70 between the opposed walls 40 of the structure, it is to be understood that when necessary such reinforcements can be used in the chambers 44 formed by the hollow ribs.

I also use in some instances a rectangular solid bar 74 for reinforcing the structure longitudinally and this bar is also useful when assembling to insure that the parts are fabricated in the proper spaced relationship.

The radiator is provided with a suitable base 92 and inlet and outlet pipes 94 and 96 respectively as shown in Fig. 1.

My improved radiator can be manufactured very inexpensively and is an improvement over radiators having cast passages, the hollow ribs of my improved structure can be made of much smaller sectional area than the conventional types of radiators so that the water or steam circulated therein can be distributed in thin layers over an extensive multiple area. The walls can be made thinner of rolled sheet metal than it is possible to make them by casting, and the smooth or planished surface of the rolled sheet metal is capable of transferring or conducting heat through the walls of the radiator much more rapidly than is possible through the walls of cast iron or comparatively rough plate steel radiators heretofore used. This feature is of particular importance in radiators as they must frequently be brought from a cold to a hot state, it being the practice in operating household heating system to bank the fires at night and allow the system to cool down considerably. With these smooth thin walled radiators made of material such as above described the heat is made available much more quickly when the fires are subsequently opened up to heat the system.

As stated above the braces 60 are also used to increase the radiating surface, as the same conduct heat from the ribs and allow it to be transferred to the air. I may also use such fins or projections merely as radiating surface and not depend on them to act as braces.

Though I have described with great particularity certain details of the embodiment of the invention illustrated, it is not to be construed that I am limited thereto as various changes may be made by those skilled

in the art. without departing from the invention as defined in the appended claims.

What I claim is:—

1. A radiator comprising a vessel formed with a series of hollow ribs and separate vertical partitions in the spaces between the outer sides of said ribs, bracing the ribs and forming air flues between them.

2. A radiator comprising a vessel formed

with a series of hollow ribs of thin sheet metal and having stiffening devices between said ribs forming air flues substantially closed in cross-section throughout their height.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.