

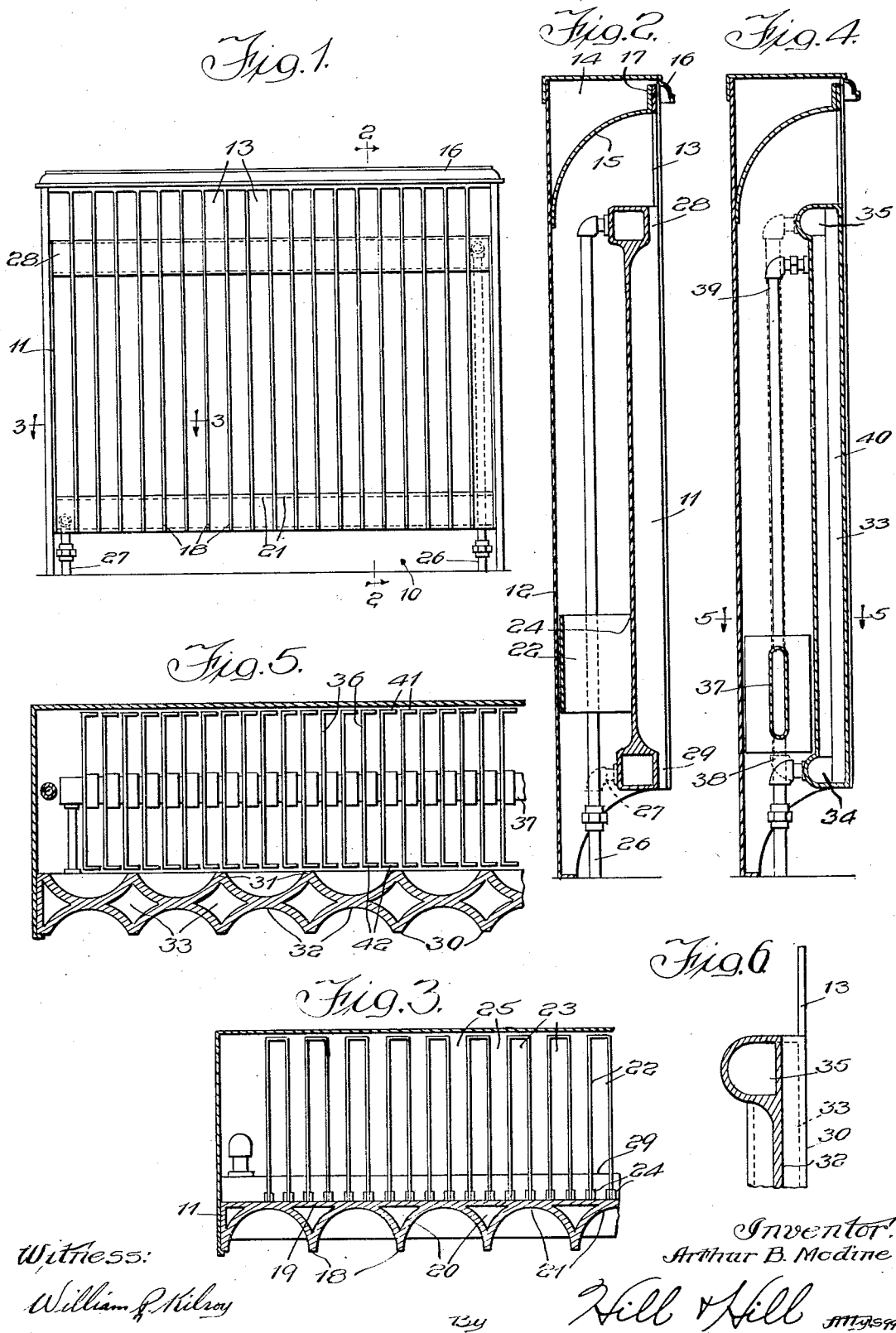
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CAST HEAT EXCHANGE DEVICE

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CAST HEAT EXCHANGE DEVICE

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The invention relates to heat exchange devices and has among its various objects the provision of a construction which is cast to provide a plurality of vertically extending heat radiating ribs and a transverse web with the material at the juncture of the ribs and webs formed to produce a fluid passage which communicates with transversely arranged fluid passages respectively providing an inlet and an outlet for said tubular passages.

A further object of the invention is to arrange these ribs, web and fluid passages relatively to each other so that a fluted construction is produced between the ribs to thus provide means causing air to contact with the fluid passages and become heated as it travels along the flutes.

It is a further object of the invention to combine heat radiating fins with a structure such as that above described and to either directly connect said fins with the device or to mount these fins upon a fluid conducting tube, the latter of which is in communication with the interior of the device.

In addition to the above, it is an object to construct the fins so that they, in effect, provide vertically extending open-ended tubes for conducting air to be heated in vertical columns along the heat exchange device, the fins being preferably located at the lower end of the structure, the upper end of the structure being provided with an apertured extension providing a grille of which openings therein communicate with the space above the fins to thereby allow heated air to escape into the room to be heated.

Another object of the invention is to provide a construction which may be arranged and housed in a recess provided in a wall or to arrange the device in a metallic casing which may be located in the recess or be arranged at one side of the wall.

The invention has these and other objects, all of which will be more readily understood when read in conjunction with the accompanying drawing which illustrates various constructions of which the invention is susceptible, it being obvious that other changes and modifications may be resorted to without

departing from the spirit of the appended claims forming a part hereof.

In the drawing, Fig. 1 is a front elevation of a device constructed according to the invention;

Fig. 2 is a section taken on the line 2—2 of Fig. 1 on a slightly enlarged scale;

Fig. 3 is a section taken on line 3—3 of Fig. 1;

Fig. 4 is a section similar to Fig. 2 showing a modified arrangement;

Fig. 5 is a section taken on line 5—5 of Fig. 4; and

Fig. 6 is an enlarged sectional view taken through the upper transverse fluid passage and web.

The structure embodying the invention is designed to be arranged in spaced relation to the floor of the room to thereby provide an opening 10 through which a portion of the relatively cool air located at the lower part of the room may pass into the casing or recess in the wall generally designated 12 and contact with the device generally designated 11, be heated and be discharged through openings such as 13 providing a grille arranged at the upper end of the structure. A tank or water container 14, having one wall such as 15, is employed which provides container for water to humidify the air in the room and deflect the heated air through the openings of the grille. The structure contemplates the utilization of a removable cover 16 for the tank or container 14, it being understood that the structure also is provided with a plurality of openings such as 17 through which the vapor may escape from the water contained in the tank 14.

It will be noted by referring to Figs. 1, 2, and 5 that this structure includes a plurality of vertically extending ribs 18 and a transversely extending wall or web 19, the juncture of the web and ribs 18 being hollow to provide a plurality of vertically extending fluid passages 20. The walls of the fluid passages are connected with the web 19 in a manner to provide a plurality of vertically extending flutes 21, the latter of which are formed by the combination of elements including the heat radiating ribs 18, web 19

and the walls of the fluid passages 20. These flutes are provided to conduct air in a vertical direction and maintain contact between the air and the fluid passages 20 during its travel and thence discharge the air in a heated condition near the openings provided in the grille 13.

As before stated, the invention contemplates the combination of heat radiating and heat conducting fins and a heat exchange device constructed as above explained. The fins shown in Fig. 3 and designated 22 are preferably of U-shaped formation and thus, in effect, will provide a plurality of vertically extending tubular passages 23. In the structures such as that illustrated in Fig. 3, it is contemplated to connect the opposite ends of the U-shaped members with the heat exchange device, generally designated 11 having flutes, by casting said ends of the U-shaped fins in lugs designated 24 which extend from one face of the heat radiating device. It will be noted by referring to Fig. 3 that when U-shaped heat radiating fins such as those just described are employed and arranged in the manner shown in Fig. 3 that the spaces produced between these heat radiating fins also provide passages such as 25 which also act to conduct the heated air in a column parallel with the flutes and toward the openings 13 in the grille.

Supply and return lines are, in the present construction, respectively designated 26 and 27. It may be here stated that the heat exchange device formed of the ribs, web, and fluid passages such as 20 and the flutes 21 are connected at opposite ends by transversely arranged fluid passages respectively designated 28 and 29 which will thus provide means for supplying heating fluid to the tubular passages 20, it being understood that the supply and returns 26 and 27 are connected with transversely arranged passages 28 and 29.

The structure shown in Fig. 5 substantially corresponds to that shown in Fig. 3, it, however, differs in that the structure shown in the former provides a heat exchange device having flutes arranged upon opposite sides of said device. This structure also differs from the former in that the heat radiating fins employed are mounted upon a tubular passage which connects with some suitable portion of the heat exchange device to provide means for introducing heating fluid to the tubular passage to thus heat the fins mounted upon the tube. In the structure shown in Fig. 5 oppositely extending vertically disposed ribs respectively designated 30 and 31 and a transversely disposed web 32 are employed. The material of the casting at the juncture of the ribs and webs is hollowed to provide vertically extending fluid passages 33 similar to the fluid passages 20 of the structure shown in Fig. 3.

The fluid passages 33 of this construction communicate with transversely arranged fluid passages respectively designated 34 and 35, the latter of which receive heating fluid through the agency of the supply and return pipes similar to those designated 26 and 27 shown in Fig. 2.

As before stated, the structure shown in Figs. 4 and 5 also contemplates the utilization of heat radiating and conducting fins. These fins are designated 36 and are mounted upon a transversely arranged tube 37. This tube is connected in any suitable manner to supply heating fluid to the tube. In the present instance, this tube 37 is elongated in cross section as shown in Fig. 4 and has its opposite ends respectively connected to the supply and return designated 38 and 39 which connect and communicate with the interior of the heat exchange device generally designated 40. These fins 36 are each provided at their opposite ends with the flanges respectively designated 41 and 42 and thus, in effect, provide a plurality of vertically arranged tubular passages.

From the foregoing description of the construction, it is manifest that a simple construction is provided which may be cast and produce a plurality of vertically extending heat radiating ribs such as 18 which are connected to a transversely arranged web such as 19 and in which the juncture of the ribs and web is hollowed to form a tubular passage such as 20, the ribs and the walls of the tubular passage and the web being connected together in a manner to provide the vertically extending flutes 21 which produce an effective construction for quickly heating and conducting the heated air in a manner so that it will be quickly heated prior to its discharge from the recess or casing in which the heat exchange device is located. It is also evident that by constructing the flutes so that a curved transverse formation is produced that the heat radiating surface is materially increased.

Having thus described the invention, what I claim and desire to secure by Letters Patent is:

1. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages and fins providing a plurality of laterally projecting air passages between said fins, arranged adjacent one of said last mentioned fluid passages.

2. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said

element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said ribs and web providing outwardly facing vertical flutes located between the tubular passages.

3. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said ribs and web providing outwardly facing vertical flutes and heat radiating fins extending laterally from said ribs and opposite to said flutes.

4. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, and heat radiating fins extending longitudinally of and laterally from said ribs along one of said last mentioned passages, a member extending from one end of said device, said member providing a grille.

5. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, a tubular member located at one end of said heat exchange device which communicates with said tubular passages and having heat radiating fins associated therewith.

6. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web intersecting and connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages and laterally projecting fins arranged longitudinally of one edge of said device.

7. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web intersecting and connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said ribs

and web providing flutes arranged upon opposite sides of said web, an apertured member providing a grille, said member being located at one end of the device and at one side of said tubular passages.

8. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web intersecting and connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said ribs and web providing flutes arranged upon opposite sides of said web, said web being extended beyond said tubular passages and being apertured to provide a grille.

9. A heat exchange device comprised of a member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web intersecting and connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said ribs and web providing flutes arranged upon opposite sides of said web, said web being extended beyond said tubular passages and being apertured to provide a grille, said last mentioned portion of said web having ribs to provide flutes in said member.

10. A heat exchange device comprised of a member having a plurality of vertically disposed hollow ribs providing fluid passages, the side walls of which connect with an adjacent similarly shaped rib and provide webs which connect said hollow ribs and provide vertical flutes between said ribs, and a transversely arranged fluid passage located at the opposite ends of said hollow ribs with which the hollow ribs communicate and hollow members providing heat radiating fins extending laterally from said member and parallel to said flutes.

11. A heat exchange device comprised of a member providing a wall of a casing, said member having a plurality of parallel vertical ribs and an element providing a transversely arranged integral web connecting said ribs, the material at the juncture of said element and ribs providing tubular passages which communicate with fluid passages respectively located at the opposite ends of said tubular passages, said member being spaced from the opposite ends of said casing to provide air passages at said ends and fins extending into said casing and arranged longitudinally of said member adjacent the lower end of said casing.

12. A heat exchange device comprised of a plate having a plurality of parallel hollow ribs, the plate being arranged relatively to the hollow ribs to provide a web which ex-

tends across the hollow ribs to provide a plurality of tubular passages of said hollow ribs, and members providing passages located at the opposite ends of said tubular passages
5 which communicate with said fluid passages provided by said hollow ribs and plate, and a member providing a fluid passage having fins, said member being arranged parallel to said tubular passages located at the ends of
10 said passages formed by the hollow ribs.

13. A radiator comprised of a casing, one wall of which is arranged relatively to the opposite ends of the casing to provide a space at said ends, said wall being comprised of a
15 plate having a plurality of parallel hollow ribs extending from one face thereof, the plate being arranged relatively to the hollow of said ribs to provide a web which extends across the hollow ribs and provides tubular
20 passages of said hollow ribs, and members providing tubular passages which communicate with said first mentioned tubular passages arranged at the opposite ends of said first mentioned tubular passages.

14. A heat exchange device comprised of a member having a plurality of parallel vertically arranged oppositely extending hollow ribs, the material between the ribs providing walls of said ribs and providing a
30 wall of oppositely facing vertical flutes located between the tubular passages.

15. A heat exchange device comprised of a plate having a plurality of parallel hollow ribs, the plate being arranged relative to the
35 hollow of said ribs to provide a web which extends across the hollow ribs and provides tubular passages of said hollow ribs and members providing passages which communicate with fluid passages respectively located at
40 the opposite ends of said tubular passages, said ribs and web providing flutes arranged between said ribs.

16. A heat exchange device comprised of a member providing a wall of a casing, said
45 member having a plurality of parallel hollow ribs and an element providing a plate connecting said hollow ribs and providing tubular passages at said ribs, members providing tubular passages respectively located
50 at the opposite ends of said first mentioned tubular passages, said first mentioned member being spaced from the opposite ends of said casing to provide air passages at opposite ends of said casing and member.

55 In witness whereof I hereunto subscribe my name this 6th day of November A. D., 1929.

ARTHUR B. MODINE.