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HEATING COIL

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2 Sheets-Sheet 1

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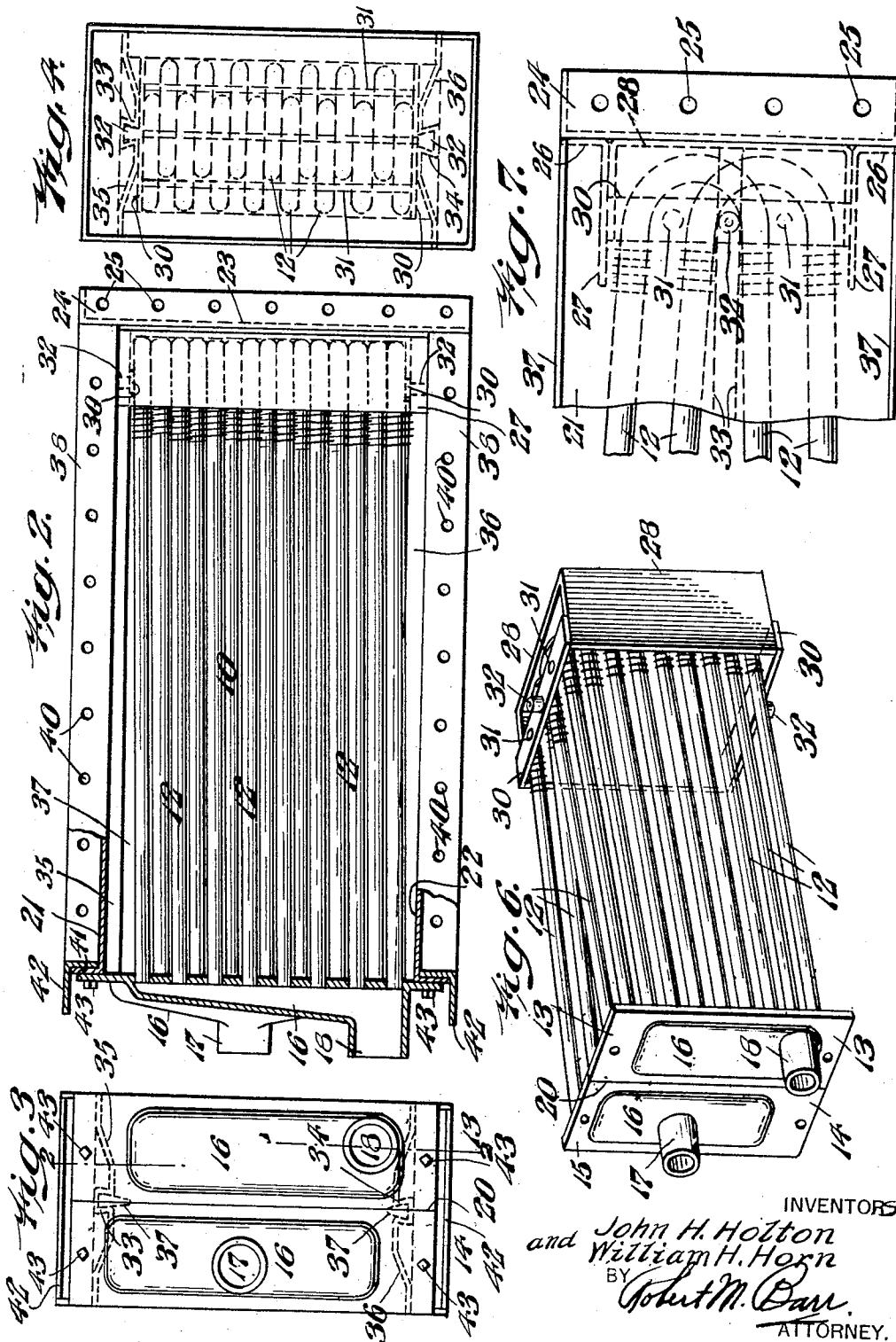
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UNITED STATES PATENT OFFICE

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HEATING COIL

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The present invention relates to radiator structures and more particularly to a coil and casing assembly whereby a heating or a cooling medium can be circulated in an efficient manner to either heat or cool a body of air. In structures of this character heretofore in use, it is customary to utilize a series of tubes through which the heating or cooling medium is circulated and to mount this system of tubes within a unitary casing which completely surrounds and encloses the tubes on the top, bottom and ends while the sides are left open for the passage of air into the casing through the tubes and out at the other side. Closed casings of this character have been found to be objectionable and open to many disadvantages in that the tubes for circulating the medium are rendered entirely inaccessible while the entire structure must be assembled as a complete unit of coils and casing prior to its shipment from the factory. In addition to this, the tubes are inaccessible for cleaning purposes while leakage at the joints of the tubes, caused by expansion and contraction, cannot be satisfactorily repaired at the point of use owing to the fact that the unitary casing has to be entirely disassembled before access can be had to the coil structure for repair. This disadvantage is materially increased where the unitary casings are connected to air ducts and the casings of other units, so that repairs and changes are almost prohibitive in cost. Furthermore, it has been commonly the practice to employ tubular structures having oppositely arranged headers, and consequently in order to allow for expansion and contraction the header plates must of necessity be formed of flexible material so that they can automatically compensate for such expansion and contraction without undue strain upon the tube joints. This flexible tube plate construction necessitates a construction in which the tube assembly is entirely contained within a casing so that the delicate end plates of the headers are protected as well as the tubes themselves.

Some of the objects of the present invention are to provide a coil and casing structure in which the two assemblies are com-

ponent parts of the same structure though readily divisible and separable so that the coil can be disconnected from and removed from the casing; to provide a structure in which the parts are readily accessible for cleaning and repair without disassembling the casing structure; to provide an efficient tube radiator of the partially closed type which is simple in construction, cheap to manufacture, and highly efficient in use and operation; to provide a casing mounting for a radiator structure wherein the latter can be readily removed and forms a part of one end of the enclosing casing; to provide a coil structure and casing structure which can be manufactured as two separate units with the one part arranged to interfit with and form a component part of the other; to provide a radiator structure which is readily accessible for cleaning and repairs without disturbing adjacent ducts or other radiators; and to provide other improvements as will hereinafter appear.

In the accompanying drawings, Fig. 1 represents a perspective of a heater unit embodying one form of the present invention; Fig. 2 represents a side elevation of the same; Fig. 3 represents an elevation of the header end of the unit; Fig. 4 represents an elevation of the other end of the unit; Fig. 5 represents a perspective of the three parts casing; Fig. 6 represents a perspective of the header and coil structure; and Fig. 7 represents a detail in plan of the closed end of the casing.

Referring to the drawings, one form of the present invention consists of a coil assembly 10 arranged to be removably mounted in a casing 11. The coil assembly 10 consists generally of tubes 12 and two headers 13 and 14, each including a tube plate 15 with a closure 16 welded thereto, the latter in one instance having an inlet fitting 17 and in the other instance an outlet or exhaust fitting 18. The tube plates 15 are of relatively stiff nonflexing metal and in the preferred form are located in the same plane and welded together along a joint 20 to form a common end plate which locates the headers directly adjacent each other. The headers 13 and 14 are con-

connected by the tubes 12 arranged in loop formation, each tube having one end united to the tube plate of one header and the other end united to the tube plate of the other header.

5 This arrangement allows for the free expansion and contraction of the tubes without stress or strain being placed upon the tube plates and joints uniting the tubes with the plates.

10 The casing 11, as here shown, consists of a top plate 21, a bottom plate 22, and one end plate 23, the other end of the casing 11 being left open with no connection between the top plate 21 and the bottom plate 22 until
15 the radiator is placed in position and the two unconnected plates of the casing are then joined directly to the header structure of the radiator. The end plate 23 has its outer face bounded by an outstanding marginal
20 flange 24 which may serve for attaching another casing part thereto by means of bolts or other fastening devices passing through provided holes 25. The inner face of the plate 23 mounts a vertically disposed socket
25 26 formed by a sheet of material provided with two inwardly directed side wings 27 which form a seat for a shield 28 fitted about the return bend end of the tube coils and serving to protect said ends.

30 Fixed to the upper and lower ends of the shield 28 are bar strips 30 which extend respectively across the top and bottom of the return bends of the coil. Stay rods 31 extend from one strip 30 to the other passing
35 through the return bends in contact with adjacent coils so that the latter are firmly held in proper staggered relation. In the present construction, one of these stay rods 31 projects at both ends through the strips 30, and
40 these ends are respectively provided with rollers 32 riding in two grooves 33 and 34. The groove 33 is formed in a sheet baffle 35 fixed to the top plate 21 and shaped to close an otherwise open passage between the coil and the top plate 21, while the groove 34 is formed
45 in a sheet baffle 36 fixed to the bottom plate 22 and shaped to close an otherwise open passage between the coil and the bottom plate 22. These grooves 33 and 34 are substantially of
50 dove-tail form in order to receive the base of a wedge shaped insert baffle 37, the function of which is to supplement the baffles 35 and 36 in order to close the space created by the downward pitch of the coils. Because of this
55 pitch of the coils, each baffle 37 is shaped with an inclination conforming to the coil pitch so that the transverse opening of gradually decreasing height is entirely closed when the baffles 37 are slid into place in the respective
60 grooves 33 and 34. When in place, one end of each baffle 37 is against the stay rod 32 and the other end of each baffle 37 in abutting relation with the plate 15. Thus the air entering from one open side of the casing is obliged
65 to pursue a course through and between the

several tube coils and no loss in efficiency occurs because none of the air can find unrestricted passages at the top and bottom of the coil unit.

For side to side connection of other units, the top and bottom plates 21 and 22 are
70 respectively provided with side edge flanges 38 provided with bolt holes 40. At the open end of the three sided casing the end flanges 41 are respectively arranged in interfitting
75 relation with transverse angle bars 42 which are held in place by the same bolts 43 that clamp the header plate 15 in position. In assembled condition, the horizontal projecting
80 sides of the angle bars 42 lie in the respective planes of the edges of the flanges 38 and hence a seating surface is provided at the top and the bottom of the casing for another unit.

The separable coil structure is fitted into
85 the casing structure by bringing the shield end between the free ends of the plates 21 and 22 and locating the rollers 32 in the respective grooves 33 and 34. The two wedge
90 shaped baffles 37 are now placed in position with one end of each seating in the entrance of its respective groove whereupon the coil unit can be pushed into the casing. During
95 this movement the header plate 15 abuts the projecting ends of the two baffles 37 and the latter are thereby caused to slide into the grooves until the proper assembled position
100 of the coil is reached. The bolts 43 are now fastened in place and the coil is ready for connecting to the supply of heating medium.

While in the foregoing reference has been more particularly made to heating, it is to be understood the invention is not limited but is
105 broadly a heat transfer unit and comprehends use as a cooling device as well.

While only a single form is shown in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be
110 applied to various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described our invention, we claim:

1. A heat transfer unit comprising a casing
115 open at one end, in combination with a unitary assembly separate from said casing including two headers, and return bend tubes having ends respectively communicating
120 with said headers, means to removably connect said headers as a closure over the open end of said casing and with said tubes within
125 said casing, clamping means for the return bend portion of said tubes, and a socket attached to said casing for receiving the clamped portion of said tubes.

2. A heat transfer unit comprising a tube structure including a header, a casing open at
130 both sides and one end arranged to receive said tube structure, and means to removably

secure the open end of said casing to said header.

Signed at Bridgeport, county of Montgomery, State of Pennsylvania, this 15th day of March, 1928.

JOHN H. HOLTON.
WILLIAM H. HORN.

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| 5 | at both sides and one end arranged to receive said tube structure, a frame formed at the closed end of said casing to form a socket to seat one end of said tube structure, and means to removably secure the open end of said casing to said header. | 70 |
| 10 | 4. A heat transfer unit comprising a casing having top and bottom plates provided respectively with longitudinally disposed grooves, a coil structure, guide members at opposite sides of said coil structure arranged to slide in said grooves respectively, and means for removably attaching said coil structure to said top and bottom plates. | 75 |
| 15 | 5. A heat transfer unit comprising a casing having top and bottom plates, baffle members attached to said plates respectively and provided with longitudinally disposed grooves, a coil structure, guide members at opposite sides of said coil structure arranged to slide in said grooves respectively, and means for removably attaching said coil structure to said top and bottom plates. | 80 |
| 20 | 6. A heat transfer unit comprising a casing having top and bottom plates, baffle members attached to said plates respectively and provided with longitudinally disposed grooves, a coil structure, guide members at opposite sides of said coil structure arranged to slide in said grooves respectively, and means for removably attaching said coil structure to said top and bottom plates. | 85 |
| 25 | 7. A heat transfer unit comprising a casing having top and bottom plates, baffle members attached to said plates respectively and provided with longitudinally disposed grooves, a coil structure, guide members at opposite sides of said coil structure arranged to slide in said grooves respectively, and means for removably attaching said coil structure to said top and bottom plates. | 90 |
| 30 | 8. A heat transfer unit comprising a casing having top and bottom plates, baffle members attached to said plates respectively and provided with longitudinally disposed grooves, a coil structure, guide members at opposite sides of said coil structure arranged to slide in said grooves respectively, and means for removably attaching said coil structure to said top and bottom plates. | 95 |
| 35 | 9. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, and means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing. | 100 |
| 40 | 10. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 105 |
| 45 | 11. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 110 |
| 50 | 12. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 115 |
| 55 | 13. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 120 |
| 60 | 14. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 125 |
| 65 | 15. A heat transfer unit comprising a casing open at one end and two sides, in combination with a header and tubes forming a unitary assembly separate from said casing, means to removably connect said header as a closure over the open end of said casing and with said tubes within said casing in the path of air traversing said casing, and a support secured to said casing for seating the inner end of said tubes. | 130 |