May 30, 1933. P. J. McINTYRE 1,911,522

UNIT HEATER

Filed April 22, 1931 2 Sheets-Sheet. 1

Fig. 1

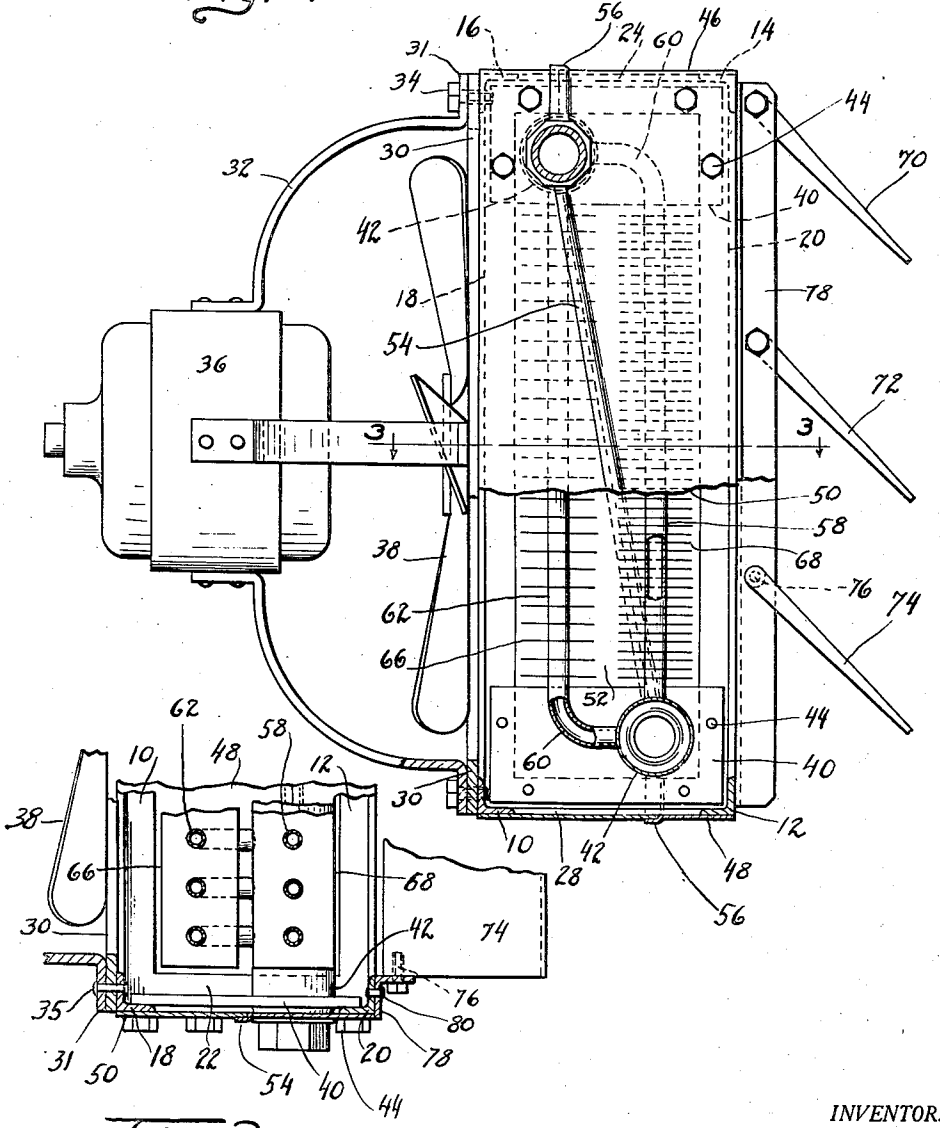


Fig. 3

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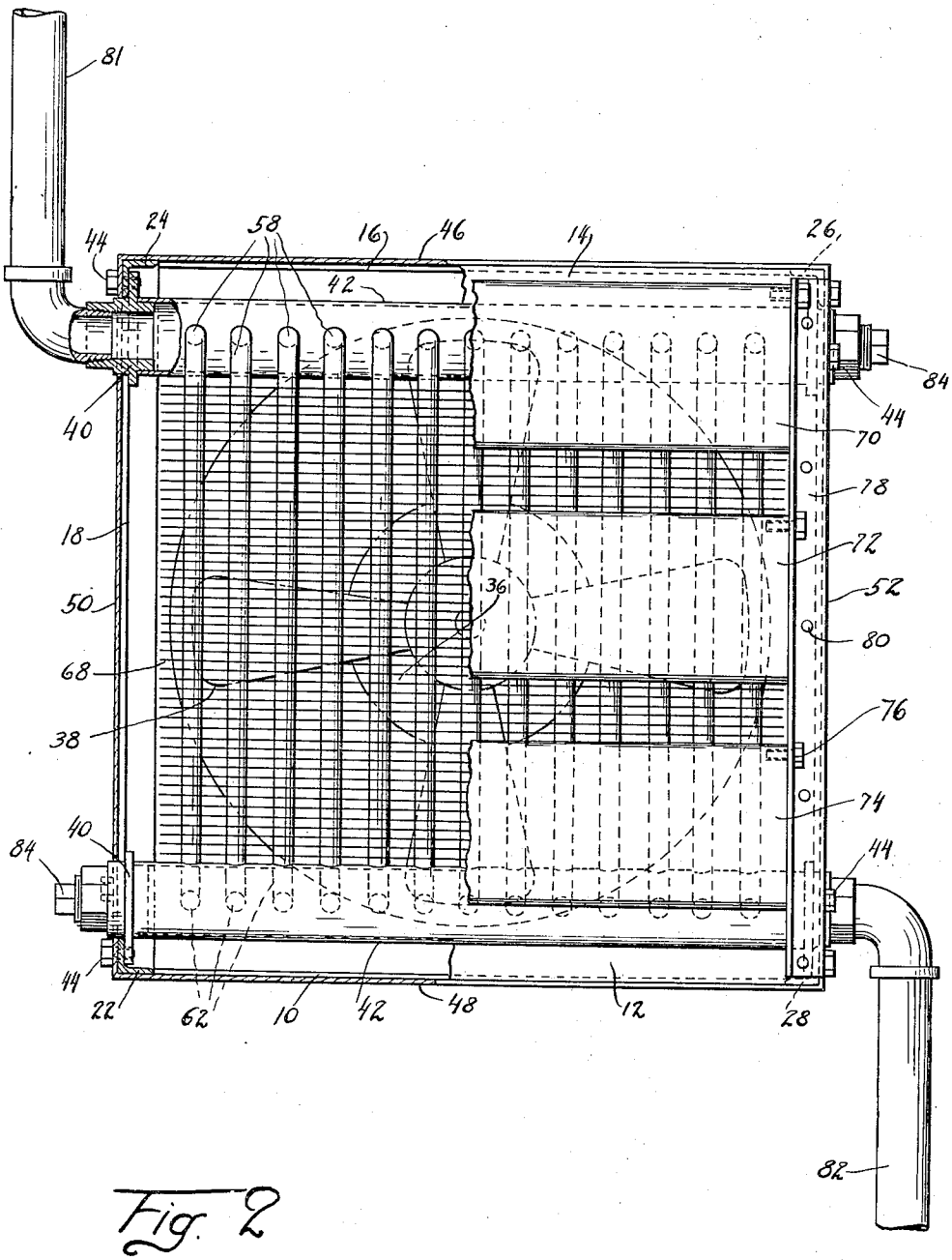


Fig. 2

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UNITED STATES PATENT OFFICE

PATRICK J. McINTYRE, OF DETROIT, MICHIGAN

UNIT HEATER

Application filed April 22, 1931. Serial No. 531,897.

My invention relates to heating apparatus especially adaptable for use in buildings and has particular reference to a unitary self contained hot air heating device.

An object of the invention is to eliminate leakage which frequently develops in the hot water or steam coils of such structures, particularly after the various joints have become loosened or ruptured as a result of contraction and expansion of the coils due to substantial temperature changes.

Another object of my invention is to arrange the coils of which my heater is comprised in such a manner that, where steam is utilized, the condensate is rapidly and effectively removed therefrom, thereby precluding the possibility of clogging the coils and securing a greater heating efficiency from the B. t. u. available in the steam.

A further object of my invention is to provide an integral compact unit built up of a minimum of inexpensive parts so associated that maximum efficiency is secured, and to so arrange the various parts that they are easy to assemble and replace in the event the latter becomes necessary.

Various other objects and meritorious features of my invention will be apparent from the following description taken in conjunction with the drawings wherein like numerals refer to like parts throughout the several figures and, wherein—

Fig. 1 is an end elevation, partly broken away and in section,

Fig. 2 is a front elevation partly broken away and in section, and

Fig. 3 is a partial section along 3—3 of Fig. 1.

Having reference now to the drawings, a frame member is built up of a plurality of angle irons. The horizontal angle irons 10, 12, 14, and 16, are arranged in parallel relation as clearly indicated in Fig. 1, and the vertical irons are arranged in similar manner, two of them being indicated at 18 and 20 in Fig. 3, their flanges welded at the corners. The two rectangular frames thus formed are connected at the four corners by transverse angle irons 22, 24, 26 and 28. A frame 30 of similar rectangular shape, constructed integrally, is positioned against the vertical flanges of the rear frame and the assembly secured together as by means of bolts 34, or rivets 35 as in Fig. 3. A support 32 is also secured to the rear of the framework by means of flanges 31 and bolts 34 may be utilized to position any desirable type of fan drive assembly, as the electric motor 36 operable to rotate the fan 38. Header units 40 and top, bottom, and side walls 46, 48, 50 and 52 are positioned as illustrated by means of bolts 44 extending therethrough and through the flanges of adjacent angle irons. Upper and lower main conduits 42 are fitted between the header units 40 in suitable fashion. These are transversely offset, as illustrated in Fig. 1. The walls are formed of two strips of sheet material which are so cut as to form a diagonal line of joinder 54 along a portion of each side wall. An offset 56 provides a neat and effective joint along the line of joinder. The purpose of providing the diagonal line of joinder between the two header units 40 is to permit the lateral positioning of the sheet material thereagainst, a semi-circular cutaway portion being provided in the strips for this purpose.

A plurality of pairs of connecting conduits or coils are positioned as indicated to communicate with the two main conduits 42. Conduits 58 are positioned in spaced apart parallel relation as indicated in Fig. 2, opening into the side of the upper main conduit 42 and being bent as illustrated at 60 to depend vertically and open into the upper wall of the lower main conduit 42. As will be noted from Fig. 1, the upper and lower header conduits are in parallel offset relation to one another. A similar series of parallel conduits 62 are associated with the two main conduits in the same manner with the exception that they are reversely positioned in so far as the bend therein is concerned. These conduits 58 and 62 are soldered into the upper and lower main conduits 42 respectively and the bend in each of them permits flexing of the conduit along the bend upon expansion and contraction due to temperature changes. In this way

the possibility of loosening the solder joints between the various conduits and consequent leakage is substantially eliminated.

By reason of the fact that one of the series of connecting conduits 58 and 62 provide openings extending directly vertically away from either of the main conduits 42, it will be apparent that either main conduit may be utilized as the "upper" conduit and the condensate will be removed therefrom as rapidly as it forms, running through the curved portion into the lower conduit into a steam trap (not shown) in the discharge line 82. The arrangement shown in Fig. 1, wherein the upper conduit is nearest the fan, is preferable. The air initially set in motion by the fan will cause the most condensate in the nearest coils, and chiefly in the upper main conduit. Vertically depending connecting conduits 62 will drain this condensate as it forms and thus render more B. t. u. in the steam available for heating the passing air.

For the purpose of increasing the efficiency of the heat circulating through the coils or conduits, I have provided a series of axially spaced apart parallel fins along each of the sets of connecting conduits 58 and 62. The fins increase the effective surface of radiation and it will be noted that the fins 66, which are associated with the connecting conduits 62, are of greater pitch than the fins 68 which are associated with the other series of connecting conduits 58. This difference in pitch permits maximum efficiency from the heating surface, the coarse pitch fins 66 functioning to preheat the air driven therethrough by the fan 38, and the finer pitch fins 68 further heating it and at the same time functioning to increase its velocity by virtue of the restricted passages provided. In this way I provide what may be regarded as a two stage heating unit which is most efficient.

Manually operable shutters 70, 72, and 74, are pivoted as at 76 to a flanged member 78 which extends along each vertical side of the frame, as indicated in Fig. 3, being positioned integrally with the remainder of the frame as by bolts or rivets 80.

Steam or hot water is circulated through the coils, being admitted at one end of one of the conduits 42 by means of the conduit 81 and issuing through the outlet conduit 82 after such circulation. This structure is illustrated in full lines in Fig. 2, the opposite ends of conduits 42 being plugged as indicated at 84.

It will be apparent, however, that the heated medium may be admitted at both ends to one of the main conduits 42 and issue in like manner from the other of the two header conduits.

Having illustrated a preferred form of structure, various modifications will be apparent to those skilled in the art and for that reason I wish to limit myself only within the scope of the appended claims.

What I claim is:

1. A unit heater comprising a pair of parallel transversely offset conduits, a plurality of parallel pairs of connecting conduits joining the two, each of said conduits including a curved portion opening into one of the offset conduits, and spaced apart fins of different pitch associated respectively with the conduits of each of said pair.

2. A unit heater including, in combination, a pair of parallel offset conduits, opposed parallel series of parallel connecting conduits extending vertically therebetween, and axially spaced apart fins of different pitch associated with each of said parallel series of conduits.

3. In combination with spaced conduits adapted to convey a heated medium, forced draft means arranged to force air across said conduits, and means associated with the conduits respectively to provide successively increasingly restricted air passages as the air is forced across the conduits by the forced draft means.

4. A heating unit including, in combination, an upper and lower header conduit, said conduits being horizontally offset from one another and substantially parallel, and forced draft means positioned in operative relation to said header conduits on the side of the assembly nearest the upper conduit whereby the forced draft first contacts the upper conduit and maximum condensation thereby occurs therein.

5. In combination with spaced conduits adapted to convey a heated medium, forced draft means arranged to force air across said conduits, and means associated with the conduits respectively to provide successively increasingly restricted air passages as the air is forced across the conduits by the forced draft means, said means including spaced apart radiating fins carried by each conduit, the fins carried by the conduits immediately adjacent to the forced draft means being spaced apart a greater distance than the fins carried by the conduits furtherest therefrom.

6. In combination with spaced conduits adapted to convey a heated medium, forced draft means arranged to force air across said conduits, and means associated with the conduits respectively to provide successively increasingly restricted air passages as the air is forced across the conduits by the forced draft means, said conduits being arranged in spaced apart tiers in front of said forced draft means, the conduits of each tier being provided with radiating fins, the radiating fins of the conduits of the tier immediately in front of the forced draft means being spaced apart a distance greater than the radiating fins of the conduits furtherest therefrom.

7. A heating unit including, in combination, an upper and lower header conduit, said conduits being horizontally offset from one another and substantially parallel, and forced draft means positioned in operative relation to said header conduits on the side of the assembly nearest the upper conduit whereby the forced draft first contacts the upper conduit and maximum condensation thereby occurs therein, spaced apart communicating conduits extending between said header conduits and arranged in front of said forced draft means, radiating fins on said communicating conduits, the fins on the communicating conduits immediately in front of the forced draft means being spaced apart a greater distance than the radiating fins carried by the communicating conduits furtherest from the forced draft means.

In testimony whereof, I, PATRICK J. McINTYRE, sign this specification.

PATRICK J. McINTYRE.