**ABSTRACT**

An air treatment system, in certain aspects, having a base, having a substantially horizontal base body, a first compressor mount structure formed integrally of the base body, and a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure; and, in other aspects, including, a housing or grill, a coil or coils, a compressor or compressors, a top cover, a fan, and/or a box for electrical items.
AIR TREATMENT SYSTEMS

BACKGROUND OF THE INVENTION

[0001] 1. Field Of The Invention

[0002] This present invention is directed to air treatment and conditioning systems; housings for components thereof; coil, compressor and/or condenser units for such systems; and methods of their use.

[0003] 2. Description of Related Art

[0004] The prior art discloses a wide variety of air conditioning systems and components thereof, including, but not limited to, air cooling systems and heat pump systems, include an indoor system, usually with a coil and a fan or blower, and an outdoor system, usually with a compressor within a housing, grill, or grid. In the manufacture of such units in many prior art methods, a particular housing can accommodate only compressors of a certain maximum height and such a compressor is only practically positionable at one place within the housing. Often, the position of a fan such as a housing limits the height of a compressor.

[0005] Typical air conditioning systems, including, but not limited to, air cooling systems and heat pump systems, include an indoor system, usually with a coil and a fan or blower, and an outdoor system, usually with a compressor within a housing, grill, or grid. In the manufacture of such units in many prior art methods, a particular housing can accommodate only compressors of a certain maximum height and such a compressor is only practically positionable at one place within the housing. Often, the position of a fan such as a housing limits the height of a compressor.

[0006] FIG. 1 illustrates a prior art outdoor condenser unit P as disclosed in U.S. Pat. No. 6,138,993 (incorporated fully herein for all purposes). The unit P has a housing O with openings N and a fan (not shown) pulls air into the housing O through the openings N. Optionally, a protective screen R is used around the housing O.

[0007] FIGS. 2A and 2B illustrate a prior art system as disclosed in U.S. Pat. No. 6,519,966 of the current inventor which has an outer housing 12 with a top cover 14 having a top opening 16 therethrough. A fan 20 is mounted adjacent or near the top opening 16 for exhausting air from within the housing 12 in an inner chamber 50 between two evaporation coils (30, 40) in the housing 12 so that air flows through each coil for heat transfer with heat transfer fluid flowing through each coil. The outer coil 30 is mounted on a base 22 (which has a drain pan in a heat pump embodiment) and has an opening 32 between its ends 34, 36. The outer coil 30 and an inner coil 40 may have any desired number of rows and/or intercommunicating slabs of tubing through which refrigerant is pumped by typical pumping apparatus. The inner coil 40 (lower in height than the outer coil 30) is also mounted on the base 22 and has an opening 42 between its ends 44, 46. Optionally a grill 26 may be placed over the opening 32 and/or 42. A compressor 15 is mounted on a base plate 28 within the inner coil 40.

SUMMARY OF THE PRESENT INVENTION

[0008] The present invention, in at least certain embodiments, teaches a new heat pump or air conditioning system with a unit which, in one aspect, houses a compressor; the housing in one aspect having an outer housing component (e.g. a grid or grill with multiple openings) which includes a base having at least two spaced-apart structures for mounting a compressor so that one or two of a plurality of different compressors can be mounted on the base. Also, with such a base, one of a plurality of different height outer housing components can be used. The height of the housing component, grid, or grill is chosen to correspond to the height of the chosen compressor so that compressors of different height can be accommodated within the housing.

[0009] In certain particular aspects, the base is of sufficient extent that blades of a fan mounted on the housing do not contact an upper portion of a compressor mounted on a base and, in one aspect, the fan is offset from a compressor on the base.

[0010] In certain particular embodiments the present invention discloses a cover for a housing which has an inwardly projecting member for abutting an interior top edge around a coil within the housing for proper positioning of the coil within the housing, for stabilizing the coil within the housing, and/or for sealing the coil-cover interface.

[0011] In other particular embodiments of the present invention, a lower base has an upturned lip and a plurality of interior spaced-apart tabs adjacent an interior of the lip. An outer housing component’s (or grid’s or grill’s) lower edge is received between the tabs and the interior of the lip for holding the outer housing component in place.

[0012] Any suitable coil, coils, or coils combination can be used in systems according to the present invention.

[0013] In one particular aspect an outer housing component according to the present invention has recesses formed thereof which receive and hold edges of a box, e.g. a support for electrical components.

[0014] In one particular aspect a system according to the present invention has a cover for a portion of the housing which is releasably connected to the housing, in one particular aspect, with a single fastener.

[0015] In one particular aspect an outer housing or grill has at least two components and end edges of the two components are held in a holder on the base to stabilize the housing components and/or to correctly position the housing or grill on the base and/or to maintain the two edges in sealing contact.

[0016] It is, therefore, an object of at least certain preferred embodiments of the present invention to provide new, useful, unique, efficient, nonobvious air treatment systems, air conditioning systems, heat pump systems, coil units for such systems, housings for such units, and methods of their use.

[0017] Certain embodiments of this invention are not limited to any particular individual feature disclosed here, but include combinations of them distinguished from the prior art in their structures, functions, and/or results achieved. Features of the invention have been broadly described so that the detailed descriptions that follow may be better understood, and in order that the contributions of this invention to the arts may be better appreciated. There are, of course, additional aspects of the invention described below and which may be included in the subject matter of the claims to this invention. Those skilled in the art who have the benefit of this invention, its teachings, and suggestions will appreciate that the conceptions of this invention may be used as a creative basis for designing other structures, methods and systems for carrying out and practicing.
the present invention. The claims of this invention are to be read to include any legally equivalent devices or methods which do not depart from the spirit and scope of the present invention.

[0018] The present invention recognizes and addresses problems and long-felt needs and provides a solution to those problems and a satisfactory meeting of those needs in its various possible embodiments and equivalents thereof. To one of skill in this art who has the benefits of this invention’s realizations, teachings, disclosures, and suggestions, other purposes and advantages will be appreciated from the following description of certain preferred embodiments, given for the purpose of disclosure, when taken in conjunction with the accompanying drawings. The detail in these descriptions is not intended to thwart this patent’s object to claim this invention no matter how others may later disguise it by variations in form, changes, or additions of further improvements.

[0019] The Abstract that is part hereof is to enable the U.S. Patent and Trademark Office and the public generally, and scientists, engineers, researchers, and practitioners in the art who are not familiar with patent terms or legal terms of phraseology to determine quickly from a cursory inspection or review the nature and general area of the disclosure of this invention. The Abstract is neither intended to define the invention, which is done by the claims, nor is it intended to be limiting of the scope of the invention in any way.

[0020] It will be understood that the various embodiments of the present invention may include one, some, or all, in any possible combination, of the disclosed, described, and/or enumerated improvements and/or technical advantages and/or elements in claims to this invention.

DESCRIPTION OF THE DRAWINGS

[0021] A more particular description of embodiments of the invention briefly summarized above may be had by references to the embodiments which are shown in the drawings which form a part of this specification. These drawings illustrate certain preferred embodiments and are not to be used to improperly limit the scope of the invention which may have other equally effective or legally equivalent embodiments.

[0022] FIG. 1 is a perspective view of a prior art system.

[0023] FIG. 2A is a perspective view of a prior art system.

[0024] FIG. 2B is a partial side perspective view of the system of FIG. 2A.

[0025] FIG. 3 is a schematic view of a system according to the present invention.

[0026] FIG. 4A is a perspective view of a system according to the present invention.

[0027] FIG. 4B is a top view of the system of FIG. 4A.

[0028] FIG. 4C is an exploded perspective view of the system of FIG. 4A.

[0029] FIG. 4D is an enlarged partial cutaway view of part of the system of FIG. 4A.

[0030] FIG. 4E is an enlarged view of part of the system shown in FIG. 4D.

[0031] FIG. 4F is an enlargement of part of the system as shown in FIG. 4B.

[0032] FIG. 4G is an enlargement of part of the system shown in FIG. 4F.

[0033] FIG. 5 is a perspective view of parts of the system of FIG. 4A.

[0034] FIG. 6A is a top perspective view of part of the system of FIG. 4A.

[0035] FIG. 6B is a top view of the part of FIG. 6A.

[0036] FIG. 6C is a bottom view of the part shown in FIG. 6A.

[0037] FIG. 6D is a side view of the part of FIG. 6A.

[0038] FIG. 6E is an end view of the part of FIG. 6A.

[0039] FIG. 7A is a top perspective view of part of the system of FIG. 4A.

[0040] FIG. 7B is a top view of the part of FIG. 7A.

[0041] FIG. 7C is a bottom perspective view of the part of FIG. 7A.

[0042] FIG. 7D is a top view of a cover according to the present invention.

DESCRIPTION OF EMBODIMENTS

PREFERRED AT THE TIME OF FILING FOR THIS PATENT

[0043] FIG. 3 shows a system 60 according to the present invention which may be either an air conditioning system for cooling air in a building, room or enclosure; or a heat pump system for heating a building, etc. The system 60 has an indoor coil system 62 with fan or blower 63; an outdoor coil system 64 with fan 65; flow lines 66, and valve systems 70, 72. The outdoor system 64 may be any system or combination thereof disclosed herein according to the present invention, including, but not limited to, a system like the system disclosed in FIG. 4A. In a heat pump embodiment, the valve systems 70, 72 include well known reversing valve(s), check valve(s), restrictor(s) etc. so that the system 60 is operable as a heat pump. Parts of the system of FIG. 4A are secured together with fasteners and/or connectors as is well known in the art, e.g. connection of the grill to the base with screws; connection of the grill to the cover with screws; bolting of the compressor to the base; and connection of the fan grid to the cover with screws.

[0044] In operation as a cooling air conditioner, the system 64 has condenser coil(s) and the coil system 62 has one or more evaporator coils.

[0045] FIGS. 4A-4E illustrate a system 100 according to the present invention and FIGS. 5, 6A-6E and 7A-7C show parts of the system 100 of FIG. 4A.

[0046] The system 100 has a base 102 which has a body 111 on which is mounted a grill 104 which has a plurality of spaced-apart openings 106 through which air is passible. In one aspect the grill 104 is made of two pieces 104a and 104b. A cover 110 covers an opening at the top of the grill 104. A fan 120 is mounted over a top opening 112 of the cover 110. A protective grid 114 covers the fan 120. A compressor 180 is mounted on the base 102.
A cover 130 is removably positioned over a box 140 (e.g. a box for electrical items, e.g. connections, switches, parts and electrical components. In one particular aspect edges 132, 134 of the box 140 are received within and held within recesses 116, 118 of the grill 104 and a single fastener 136 (e.g. bolt, screw, rivet) through a flange 143 of the box 140 holds the cover 130 in place. Edges 135, 137 of the cover 130 are also positioned in and held in the recesses 116, 118 respectively. The box 140 may be any suitable dimensions for a space between end edges of the grill 140. In one aspect the recesses 116, 118, which are formed integrally of the ends 148, 149 of the grill 140, are sufficiently tight and of such dimensions that the box edges 132, 134 and the cover edges 135, 137 are held sealingly together so that the cover 130 sealingly closes off a box opening 146. Optionally, the fastener 136 may be deleted. Optionally, the recesses 116, 118 are deleted and the cover 130 is secured in place with releasably-cooperating fastener material, e.g., but not limited, hoop-loop material or mechanical reclosable “mushroom” head material. Optionally, only the box edges are in the housing recesses. Optionally, only the box cover edges are in the housing recesses. The housing recesses can be formed integrally of ends of the housing or they can be separate pieces connected to the ends of the housing.

Connections 122, 124 are fluid connections for flowing fluid; e.g. vapor into the connection 124 led to the compressor and liquid out from the coil through the connection 122. Appropriate known connections between the compressor and the coil are used.

A coil 150 is mounted on the base 102 and a top interior portion 152 along a top edge 154 abuts a downwardly projecting shoulder 113 of the cover 110.

The base 102 has spaced-apart compressor mounting structures 160, 170. The compressor mount 160 has a downwardly projecting recess 162 into which is placed a lower part of a compressor. Spaced-apart pedestals 164 project up from the base 102 for securement thereto of mounting structure (e.g. pads, arms, etc.) of a compressor. Holes 166 provide fluid drainage from the compressor mount recesses.

The compressor mount 170 has a recess 172 into which is placed a lower part of a compressor (e.g., as shown, the compressor 180). Pedestals 174 project up from a bottom 176 of a recess 178 of the base 102 and mounting structures 183 of the compressor 180, e.g. including pads, are secured to the pedestals 174. Optional downwardly projecting legs 182 provide a space between the base 102 and a floor, ground, structure, or support on which the base 102 is located. Tabs 184 projecting up from the base 102 adjacent a lip 186 around the base 102 provide holders for the bottom edge of the grill 104 (see, e.g. FIG. 43) which stabilize the grill 104 and hold it in a desired position on the base. Reinforcements 185 interconnected between the body 111 and the lip 186 strengthen the lip 186/body 111 interface whether the lip 186 is attached to or formed integrally of the body 111. In certain aspects the bottoms of the recesses 162, 172 extend beneath the base 102 so that they sit on the ground or floor beneath the base 102.

The cover 110 has an indentation 117 in a shoulder 113 which is sized and located to accommodate part of an upper portion of a compressor mounted on the compressor mount 160. Thus, the vertical extent of the indentation 117 provides for additional height for a compressor under the cover 110. Positioning of the opening 119 in the cover 110 provides for a fan mounting located so that blades of the fan do not hit an upper part of a compressor which is sufficiently high that the fan blades would otherwise hit the top of the compressor. A rim 123 encircles the opening 119. A series of tabs 125 are positioned around the entire periphery of a lip 129 of the cover 110. A top part of the grill 104 is positioned between these tabs 125 and the lip 129 to correctly position the grill 104, to stabilize it, and/or to enhance a sealing contact between the grill 104 and the lip 129. The shoulder 113 is optional. The indentation 117 is optional.

Spaced-apart tabs 125 projecting down from the cover 110 are located adjacent a downwardly-projecting lip 129 of the cover 110 so that a top edge of the grill 104 is received between the tabs 115 and the lip 129 and held therebetween (see, e.g. FIG. 7B) to stabilize the grill 104 and to hold it in a desired position.

FIG. 7D shows an alternate embodiment 108 for a cover like the cover 110. An indentation 117a extends relatively further (as viewed from above in FIG. 7D) than does the indentation 117 described above. It is within the scope of the present invention to make this indentation of any desired extent to accommodate a top of a compressor.

Optionally, a base 102 may have a holder 109 for holding adjacent ends of parts of a grill. As shown in FIGS. 4F and 4G, ends 104c and 104d of grill pieces 104a and 104b, respectively, are held within a recess 109a of the holder 109. The ends 104c, 104d may be held in the recess 109 with a friction fit and/or with adhesive and/or with a fastener (not shown). Such a holder may also be used on the cover 110. In one aspect the ends 104c, 104d are held in sealing contact by the holder 109.

With a base, e.g. like a base 102, when a particular compressor of a particular height is selected, then a grill of a corresponding height may be used and a box of a corresponding height may be used. The same cover (and fan apparatus) can be used with compressors of different heights.

Optionally, a base 102 may have a holder 109 for holding adjacent ends of parts of a grill. As shown in FIGS. 4F and 4G, ends 104c and 104d of grill pieces 104a and 104b, respectively, are held within a recess 109a of the holder 109. The ends 104c, 104d may be held in the recess 109 with a friction fit and/or with adhesive and/or with a fastener (not shown). Such a holder may also be used on the cover 110. In one aspect the ends 104c, 104d are held in sealing contact by the holder 109.

The present invention, therefore, provides in some, but not in necessarily all, embodiments an air treatment system with a base, having a substantially horizontal base body; a first compressor mount structure formed integrally of the base body; and a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure. Such an air treatment system may have one or some, in any possible combination, of the following: a base lip around the base body and projecting upwardly therefrom, and a plurality of spaced-apart tabs on the base body and adjacent the lip, the tabs located so that part of a housing mountable on the base body is positionable between the tabs and the base lip; a holder on
the base body, the holder having a recess for holding ends of pieces of a housing mountable on the base; a housing mounted on the base body, the housing having an upper part defining a top housing opening, the housing having a plurality of spaced-apart openings through which air is flowable into and out of the housing; a cover secured to the housing and closing off part of the top housing opening, and the cover having a cover opening through which air is flowable; the cover has a cover body with a main body portion at a first level, and the cover body has an indented portion at a level higher than the first level for accommodating a top portion of a compressor mounted on the base beneath the indented portion of the cover; the cover has a cover body with a main body portion and a shoulder projecting downwardly from the main body, the shoulder for abutting an upper part of a coil mounted on the base; the cover has a cover lip therearound and projecting downwardly therefrom, the cover has a plurality of spaced-apart tabs projecting downwardly therefrom and adjacent the cover lip, and the cover tabs located so that an upper part of a housing on the base is positionable between the cover tabs and the cover lip; wherein the housing has a housing first end spaced-apart from a housing second end, a box positioned between the housing first end and the housing second end, the box for electrical items of the system, the housing first end having a first recess, the housing second end having a second recess, the box having a first box edge disposed and held in the first recess, and the box having a second box edge disposed and held in the second recess; a box having a box front opening, a box cover for releasable emplacement over the box front opening to close off the box front opening, the box cover having a first cover edge disposed in and held in the first recess adjacent the first box edge, and the box cover having a second cover edge disposed in and held in the second recess adjacent the second box edge; wherein adjacent box edges and cover edges are held in sealing contact; wherein the box has a box flange, and a single fastener connects the box cover to the box flange; wherein the housing recesses are formed integrally of edges of the housing; a coil apparatus on the base; a compressor mounted on a mounting structure on the base; and/or a fan apparatus mounted atop the housing for exhausting air from the housing.

The present invention, therefore, provides in some, but not in necessarily all, embodiments a base for an air treatment system, the base with a substantially horizontal base body, a first compressor mount structure formed integrally of the base body, and a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure.

The present invention, therefore, provides in some, but not in necessarily all, embodiments a cover for an air treatment system, the cover having a cover body with a main body portion at a first level, the cover body having an indented portion at a level higher than the first level for accommodating a top portion of a compressor beneath the indented portion of the cover. Such an air treatment system may have one or some, in any possible combination, of the following: a shoulder projecting upwardly from the main body portion, the shoulder for abutting an upper part of a coil beneath the cover, a cover lip around the main body portion and projecting downwardly therefrom, a plurality of spaced-apart tabs projecting downwardly from the main body portion and adjacent the cover lip, and the cover tabs located so that an upper part of a housing is positionable between the cover tabs and the cover lip.

In conclusion, therefore, it is seen that the present invention and the embodiments disclosed herein are well adapted to carry out the objectives and obtain the ends set forth. Certain changes can be made in the subject matter without departing from the spirit and the scope of this invention. It is realized that changes are possible within the scope of this invention and it is further intended that each element or step recited herein is to be understood as referring to the step literally and/or to all equivalent elements or steps. This specification is intended to cover the invention as broadly as legally possible in whatever form it may be utilized. All patents and applications identified herein are incorporated fully herein for all purposes.

What is claimed is:

1. An air treatment system comprising
a base, having a substantially horizontal base body,
a first compressor mount structure formed integrally of the base body, and
a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure.

2. The air treatment system of claim 1 further comprising
a base lip around the base body and projecting upwardly therefrom, and
a plurality of spaced-apart tabs on the base body and adjacent the lip, the tabs located so that part of a housing mountable on the base body is positionable between the tabs and the base lip.

3. The air treatment system of claim 1 further comprising
a holder on the base body, the holder having a recess for holding ends of pieces of a housing mountable on the base.

4. The air treatment system of claim 1 further comprising
a housing mounted on the base body, the housing having an upper part defining a top housing opening, the
13. The air treatment system of claim 9 wherein the housing recesses are formed integrally of edges of the housing.
14. The air treatment system of claim 1 further comprising a coil apparatus on the base.
15. The air treatment system of claim 1 further comprising a compressor mounted on a mounting structure on the base.
16. The air treatment system of claim 4 further comprising a fan apparatus mounted atop the housing for exhausting air from the housing.
17. An air treatment system comprising a base, having a substantially horizontal base body,
a first compressor mount structure formed integrally of the base body,
a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure,
a housing mounted on the base body, the housing having an upper part defining a top housing opening, the housing having a plurality of spaced-apart openings through which air is flowable into and out of the housing,
a compressor mounted on a mounting structure on the base,
a cover secured to the housing and closing off part of the top housing opening,
the cover having a cover opening through which air is flowable,
the cover having a cover body with a main body portion at a first level,
the cover having a cover lip therearound and projecting downwardly therefrom,
the cover has a plurality of spaced-apart tabs projecting downwardly therefrom and adjacent the cover lip, and
the cover tabs located so that an upper part of a housing on the base is positionable between the cover tabs and the cover lip.
18. A base for an air treatment system, the base comprising a substantially horizontal base body,
a first compressor mount structure formed integrally of the base body, and
a second compressor mount structure formed integrally of the base body and spaced-apart from the first compressor mount structure.
19. A cover for an air treatment system, the cover comprising a cover body with a main body portion at a first level,
the cover body having an indented portion at a level higher than the first level for accommodating a top portion of a compressor beneath the indented portion of the cover.
20. The cover of claim 19 wherein
a shoulder projecting upwardly from the main body portion,
the shoulder for abutting an upper part of a coil beneath the cover,
a cover lip around the main body portion and projecting downwardly therefrom,
a plurality of spaced-apart tabs projecting downwardly from the main body portion and adjacent the cover lip, and
the cover tabs located so that an upper part of a housing is positionable between the cover tabs and the cover lip.

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