United States Patent

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[54] SECTIONALIZED SELF-CONTAINED AIR CONDITIONING UNIT

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[52] **U.S. Cl.**.....**62/262,** 62/298

[51] **Int. Cl.**.....**F25d 23/12**

[58] **Field of Search** 62/262, 298, 302, 408

[56] **References Cited**

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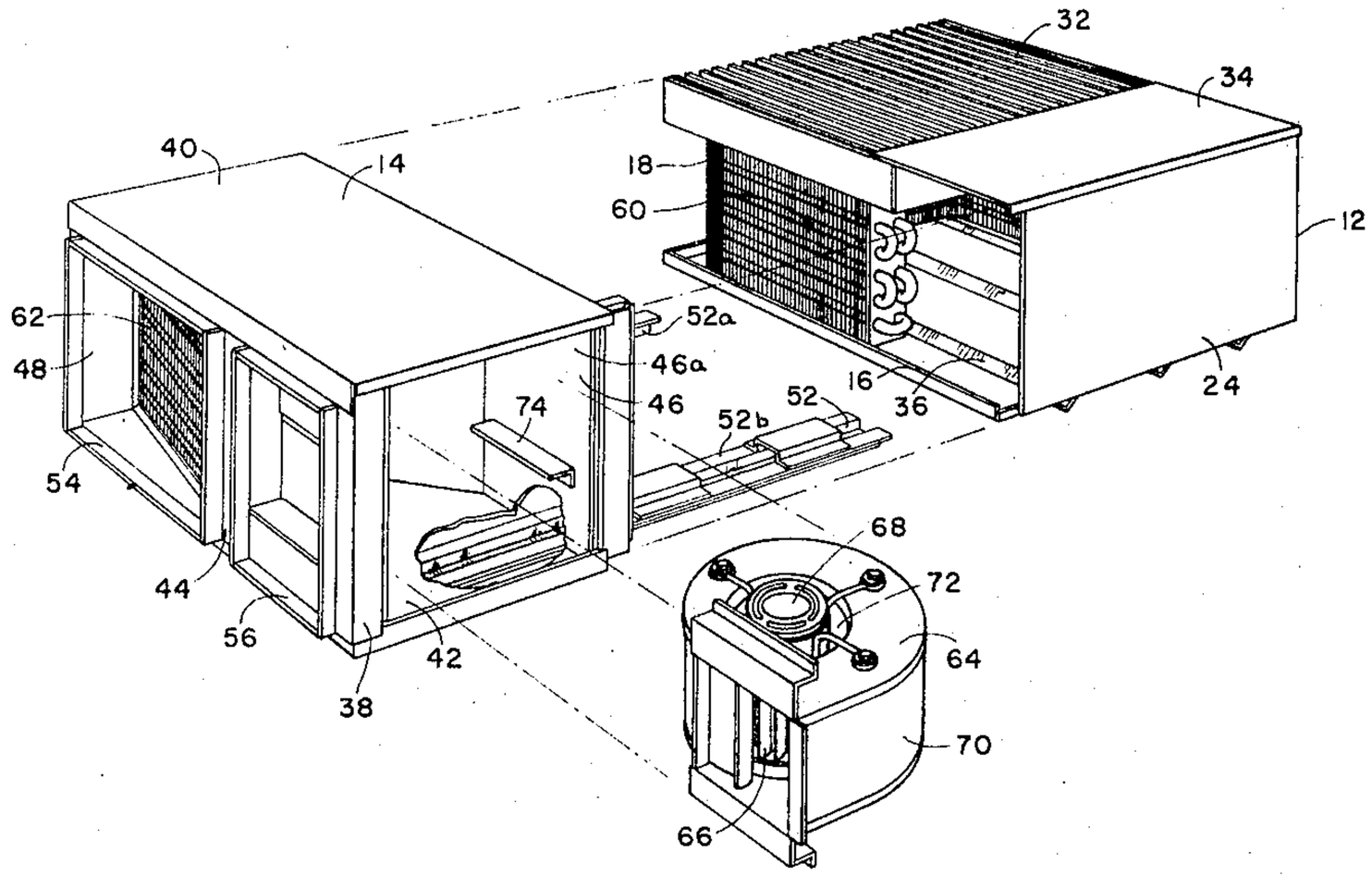
[57] **ABSTRACT**

An air-cooled condenser section has its own support pan capable of supporting the components of the condenser section independently of the evaporator section. The evaporator has a subframe which extends outwardly therefrom for attachment in underlying relationship to the condenser section to thereby define a self-contained unitary air conditioning unit. The evaporator section has a recessed sidewall defining a channel for conducting cooling air to a portion of the condenser section embraced by the evaporator section. Vertically oriented compressor, heat exchangers, and blowers in both evaporator and condenser sections permit the use of the same size bottoms, tops, and subframe for different size units.

7 Claims, 5 Drawing Figures



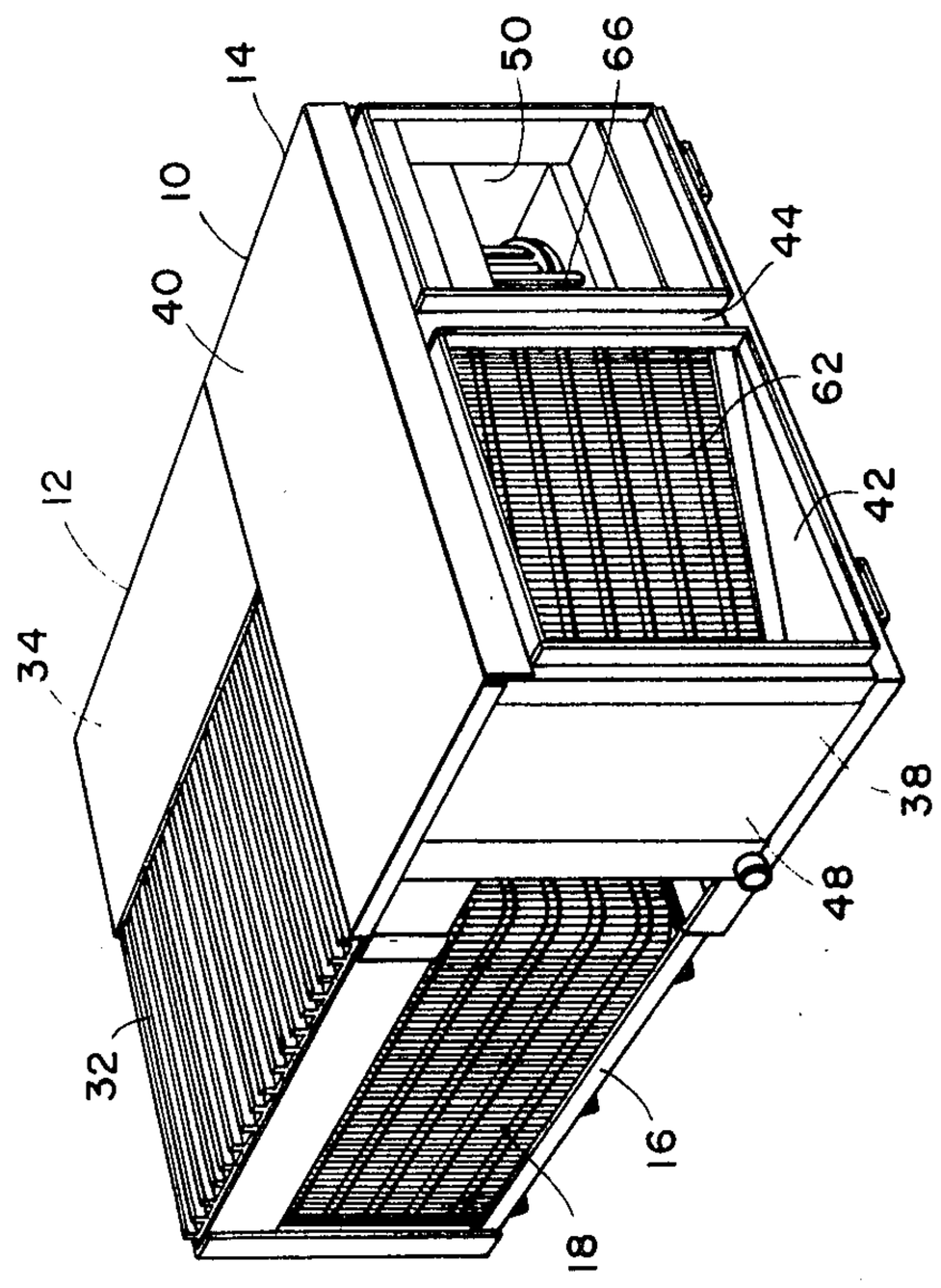


FIG. 1

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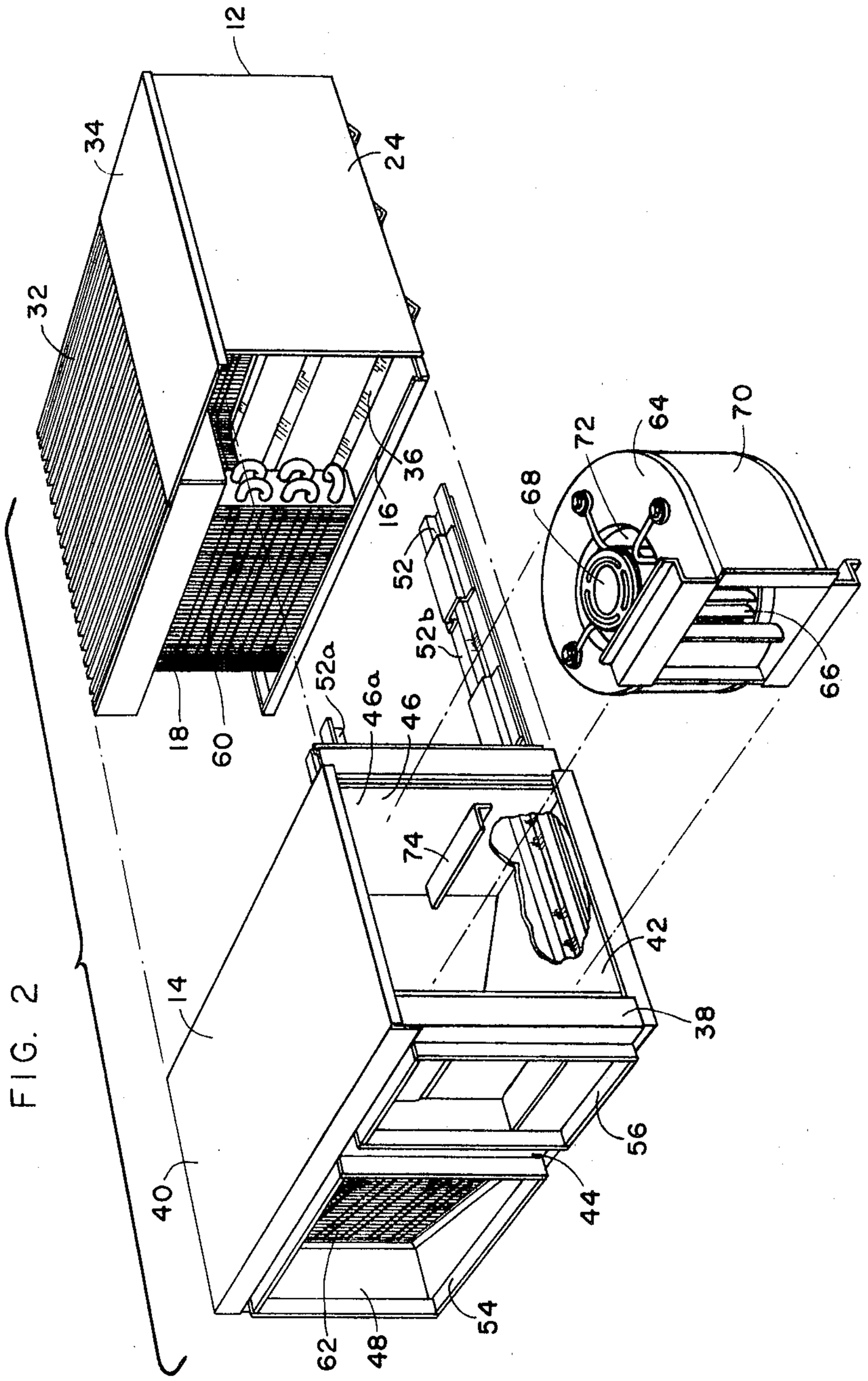

FIG. 2

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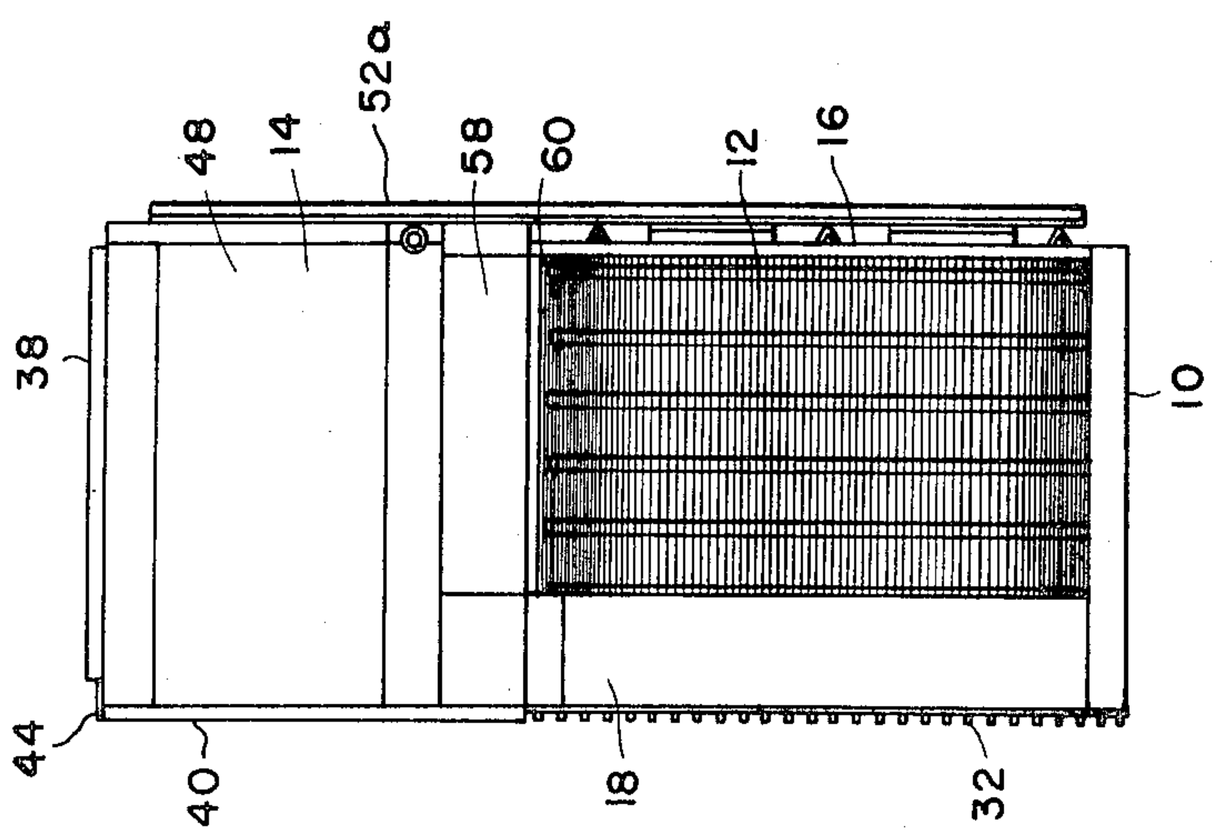

FIG. 5

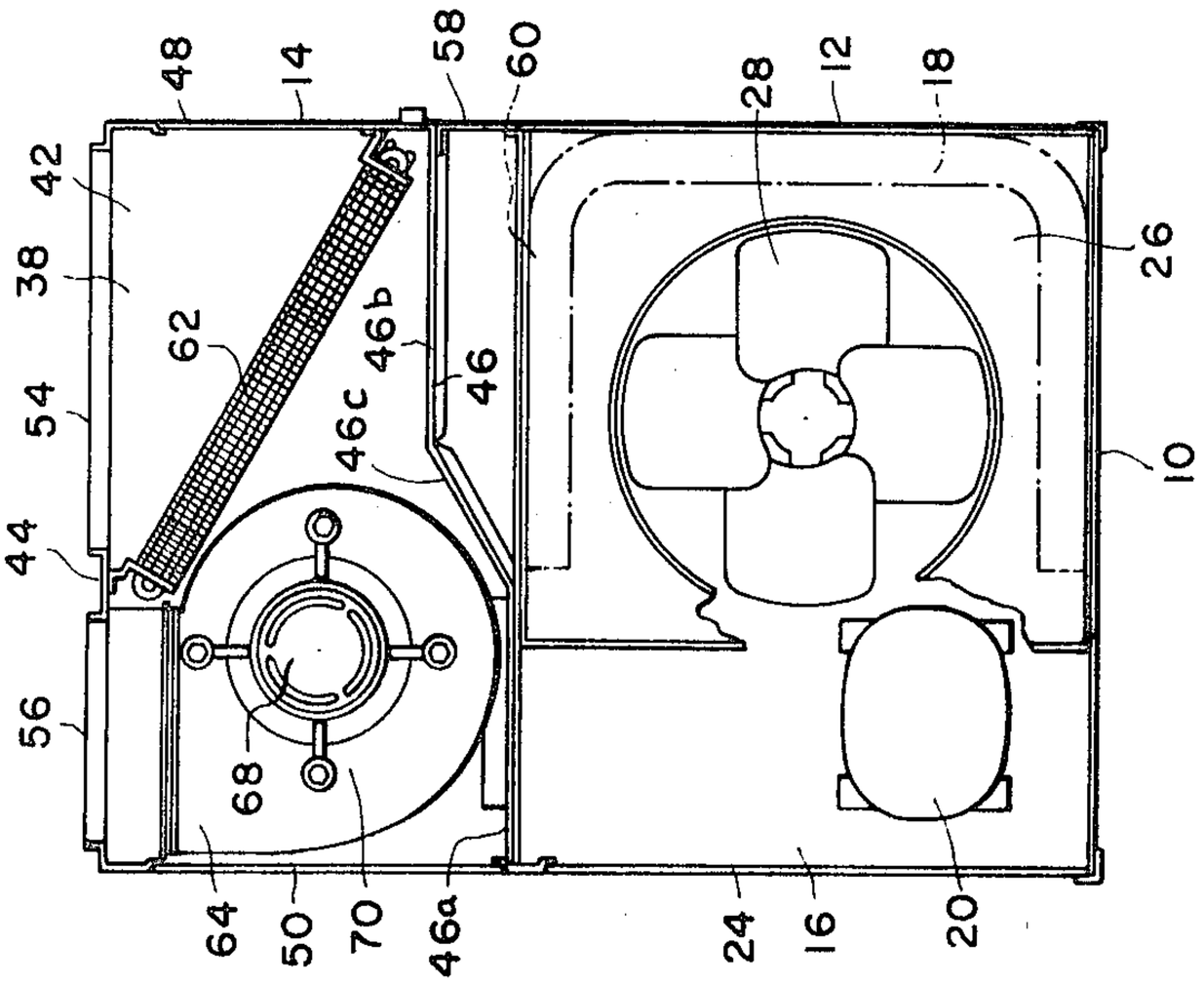

FIG. 3

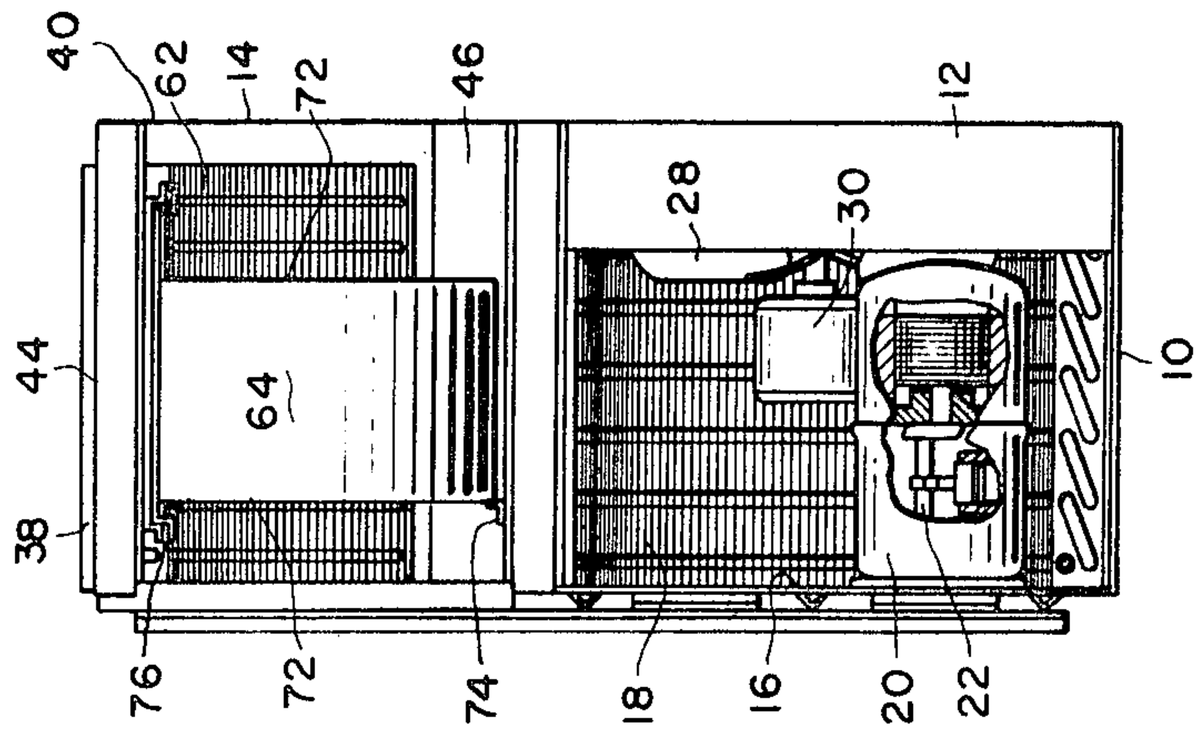

FIG. 4

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SECTIONALIZED SELF-CONTAINED AIR CONDITIONING UNIT

BACKGROUND OF THE INVENTION

A great many residential and small commercial central type air conditioning systems produced today are of the type known as a split system wherein the condenser section containing an air-cooled refrigerant condenser heat exchanger, a refrigerant compressor, and a condenser fan or blower are mounted usually outdoors as a unit remote from the evaporator section which usually is disposed in the plenum of the furnace associated with the conditioned space.

Another type of air conditioning system in common use today is the self-contained unit in which the components immediately associated with both the evaporator and condenser are mounted on one common bottom wall or frame of a common housing. Such units may be mounted in crawl spaces, on the roof, or on a slab immediately adjacent the structure to be air conditioned. The air to be conditioned is ducted to and from the self-contained unit.

The existance of these two basic types of residential and small commercial air conditioning equipment has lead most manufacturers to produce two completely separate lines of products requiring substantially completely separate tooling and production lines for the two products. The duplicated costs are multiplied in most cases where different size units are made available. These costs must ultimately be reflected in the consumer prices of this residential and small commercial air conditioning equipment.

SUMMARY OF THE INVENTION

The primary objective achieved by the instant invention is to provide a self-contained type air conditioning unit which utilizes the basic structure of a split system condensing unit in combination with an evaporator section attachment whereby much of the tooling cost can be avoided.

Another object of the invention is to orient all components including the compressor, condenser, evaporator, condenser fan and evaporator fan in an altitude so that size variations vary primarily their vertical extent so that same top and bottom walls as well as subframe structure can be used for different size units.

Another object of the instant invention is to provide means associated with the evaporator section for conducting condenser cooling air for that portion of the condenser section which is embraced by the evaporator section attachment.

Other objects and advantages will become apparent as this specification proceeds to describe the invention with reference to the drawings in which like reference numerals designate like parts throughout wherein:

FIG. **1** is a perspective of the self-contained air conditioning unit embodying the invention;

FIG. **2** is an exploded perspective showing the separate condenser and evaporator sections of the air conditioning unit of FIG. **1**. Also the evaporator blower has been slid outwardly from the evaporator section;

FIG. **3** is a plan view of the air conditioning unit of FIG. **1** having the top panels and condenser discharge grill removed;

FIG. **4** is an elevational showing one side of the air conditioning unit of FIG. **3** having side panels thereof removed and portions of the compressor sectioned; and

FIG. **5** is an elevation showing the other side of the air conditioning unit of FIG. **3** particularly showing the air inlet opening of a channel within the evaporator section for conducting air to the condenser section.

DETAILED DESCRIPTION

Now referring to the drawing it will be seen that the self-contained air conditioning unit **10** is comprised of an air-cooled refrigerant condensing section **12** and an air-cooling refrigerant evaporator section **14**.

The condenser section **12** includes a rectangular base or support pan **16** of sufficient rigidity to support, as an independent unit, the U-shaped fin-and-tube type air-cooled refrigerant condenser heat exchanger **18** having vertical faces paralleling three edges of pan **16**, the refrigerant reciprocating compressor **20** having a crankshaft **22** oriented for rotation about a vertical axis, the removable access side panel **24** for servicing compressor **20** and controls, the condenser discharge fan orifice plate **26** disposed above condenser heat exchanger **18**, the condenser blower or fan **28** disposed at the orifice of plate **26**, the condenser fan motor **30** drivingly connected to fan **30**, the discharge grille **32**, and top panel **34**. Conventional fasteners, not shown, may be employed to connect these elements in the position shown in the drawings. Pan **16** is preferably provided with stiffening ribs **36** or corrugations at spaced intervals to permit condenser section **18** to be used an an independent condensing unit of an air conditioning split system.

Evaporator section **14** has a housing **38** including a top wall **40**, a bottom wall **42**, a front sidewall **44**, a back sidewall **46**, and first and second end sidewalls **48** and **50** respectively. A subframe **52** in the form of a pair of beams **52***a* and **52***b* constructed of sheet metal and having a channel shaped cross section is connected to the underside of bottom wall **42** and extends horizontally outwardly beyond housing **38** in underlying relationship to support pan **16** of condenser section **12**. Appropriate screws and bolts, not shown, connect support pan **16** to evaporator section subframe **52**.

The front sidewall **44** of evaporator section housing **38** has an inlet aperture **54** for receiving air to be cooled and an outlet aperture **56** for discharging air that has been cooled; apertures **54** and **56** being disposed in horizontally spaced side-by-side relationship. Back sidewall **46** has a first portion **46***a* (see FIGS. **2** and **3**) which extends along the back edge of bottom wall **42** in an area opposite discharge aperture **56**, and a second portion **46***b* disposed generally opposite inlet aperture **54** and which extends along a path closer to front sidewall **44** than first portion **46***a* and spaced from the back edge of bottom wall **42**. The first and second portions, **46***a* and **46***b*, of back wall **46** are connected via an oblique portion, **46***c*. Portions **46***b* and **46***c* and those portions of top and bottom walls, **40** and **42**, disposed rearwardly of portions **46***b* and **46***c* define a channel having an inlet opening at **58** for conducting cooling air to face **60** of condenser heat exchanger **18**. It will be noted that the space between portion **46***a* of back wall **46** and front wall **44** is somewhat deeper than the space between portion **46***b* and front wall **44**. A fin and tube evaporator heat exchanger **62** having a generally flat rectangular face extends between front wall **44** and sidewall **48** across inlet aperture **54** in the shallower space between front wall **44** and portion **46***b* of back wall **46** of housing **38** whereby air entering aperture **54** is directed through heat exchanger **62** and thereby cooled. A centrifugal blower **64** for moving the air from heat exchanger **62** out through discharge aperture **56** is disposed within the deeper space between portion **46***a* of back wall **46** and front wall **44**. Evaporator blower **64** has an impeller **66** oriented to be rotatably driven about a vertical axis by motor **68** within blower housing **70**. By disposing blower **64** in the deeper space, the blower may have a larger diameter and shorter vertical extent thereby providing ample space for air to pass from heat exchanger **62** to the air inlets **72** at the top and bottom sides of blower housing **70**. Blower **64** is supported on rails **74** and **76** so that it may be horizontally slid from evaporator housing **38** after removal of sidewall **50** as shown in FIG. **2** for purposes of service.

Evaporator heat exchanger **62**, compressor **20**, condenser heat exchanger **18** and a refrigerant throttling means (not shown) are respectively serially connected in a conventional refrigerant circuit whereby heat is absorbed from the air passing through evaporator heat exchanger **62** and transferred to air passing through condenser heat exchanger **18**.

The self-contained air conditioning unit may be made in a variety of capacities using the same top and bottom portions simply by varying the vertical extent of condenser heat exchanger **18**, evaporator heat exchanger **62**, compressor **20**, evaporator blower **64** and condenser fan and motor **28** and **30**.

From the foregoing description it will be seen that the self-contained air conditioning unit may be constructed by providing the condensing unit of a split system with an evaporator section attachment which has a subframe for supporting the condensing unit support pan. Further, the evaporator section attachment is provided with an air conducting channel for conducting condenser cooling air to that portion of the condenser unit covered by the evaporator section attachment.

Having now described in detail the preferred embodiment of my invention, I contemplate that many changes may be made without departing from the scope or spirit of my invention and I accordingly desire to be limited only by the claims.

I claim:

1. Refrigeration apparatus comprising:

an evaporator section having a housing; a refrigerant evaporator heat exchanger disposed in said housing; a first blower disposed in said housing for passing air in heat exchange relation with said refrigerant evaporator heat exchanger; and a first motor drivingly connected to said first blower; a frame supportingly connected to said refrigerant evaporator heat exchanger, said first blower, said first motor and said housing, said frame being disposed below said housing and extending horizontally substantially beyond said housing; an air cooled condenser section having a refrigerant condenser heat exchanger; a refrigerant compressor; a second blower disposed to pass cooling air over said condenser heat exchanger; a second motor drivingly connected to said second blower; and a support pan means disposed below said compressor and said condenser heat exchanger for supporting said condenser heat exchanger, said compressor, said second blower and said second motor independently of said evaporator section; the extending portion of said frame being disposed below and connected to said support pan means of said condensing unit.

2. Refrigeration apparatus comprising: a condensing section having a generally rectangular pan-like frame, and an air-cooled refrigerant condenser heat exchanger disposed on said frame and having a plurality of substantially vertical faces adjacent a plurality of margins of said pan-like frame; an evaporator section abutting said condenser section at one of said plurality of vertical faces of said condenser heat exchanger and having a housing including top, bottom and sidewalls, one of said sidewalls being disposed inwardly of the edges of said top and bottom walls to define a channel for conducting condenser cooling air for that portion of said condenser heat exchanger over which said evaporator section lies.

3. The apparatus as defined by claim 2 including a subframe underlying said evaporator section housing and extending horizontally beyond said housing to support said pan-like frame of said condenser section.

4. A self-contained air conditioning unit comprising in combination: an air-cooled condenser heat exchanger having a generally vertical face, an air cooling evaporator heat exchanger having a generally vertical face, a first blower disposed to rotate about a vertical axis for passing air through said condenser heat exchanger, a reciprocating compressor having a crankshaft disposed to rotate about a vertical axis, and a centrifugal blower having a cylindrical housing for which the generatrix is vertical and an impeller disposed to rotate within said housing about a vertical axis for passing air through said evaporator heat exchanger, said vertical axes of said first blower, said impeller and said compressor all being spaced horizontally from each other and all being spaced horizontally from said vertical faces of said condenser and evaporator heat exchangers, and said vertical faces of said condenser and said evaporator heat exchangers being spaced horizontally from each other.

5. Refrigeration apparatus comprising: an air-cooled refrigerant condensing section having a generally rectangular pan-like frame, an air-cooled refrigerant condenser heat exchanger disposed on said frame and having a plurality of substantially vertical faces adjacent plural margins of said pan-like frame; and a refrigerant evaporator section abutting said condenser section at one of said plurality of vertical faces of said condenser heat exchanger and having a housing including sidewalls and a generally rectangular bottom wall, a refrigerant evaporator heat exchanger disposed within said housing, a first of said sidewalls being generally parallel to one edge of said rectangular bottom and being provided with air inlet and outlet openings to conduct air to and from said evaporator heat exchanger, a second of said sidewalls disposed opposite said first sidewall having a first portion disposed a relatively greater distance from said first sidewall than a second portion thereof, said second portion of said second sidewall being disposed in face-to-face spaced relationship with said one face of said condenser heat exchanger to thereby define an air conducting channel to said one face of said condenser heat exchanger, and a centrifugal evaporator blower disposed between said one portion of said second sidewall and said first sidewall for passing air from said inlet opening over said evaporator heat exchanger to said outlet opening.

6. Air conditioning apparatus comprising: an evaporator section including a unit housing having top, bottom, and sidewalls, an evaporator heat exchanger disposed within said unit housing, inlet and outlet openings in sidewalls of said unit housing disposed in horizontal side-by-side relationship, a centrifugal blower within said unit housing having a cylindrical housing for which the generatrix is generally vertical and an impeller wheel within said blower housing disposed to rotate about a vertical axis, said evaporator heat exchanger being positioned in a fluid path between said inlet opening of said unit housing and said inlet opening of said blower housing.

7. The apparatus as defined by claim 6 wherein said bottom wall is generally rectangular and said inlet and outlet opening are disposed in a common plane generally parallel to one edge of said bottom wall and said blower housing extending into the space defined by said blower inlet opening projected inwardly of said unit housing normally of said common plane.

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