July 7, 1959 S. H. BLUM 2,893,220

AIR CONDITIONER UNIT

Filed May 22, 1956 2 Sheets-Sheet 1

Fig. 1.

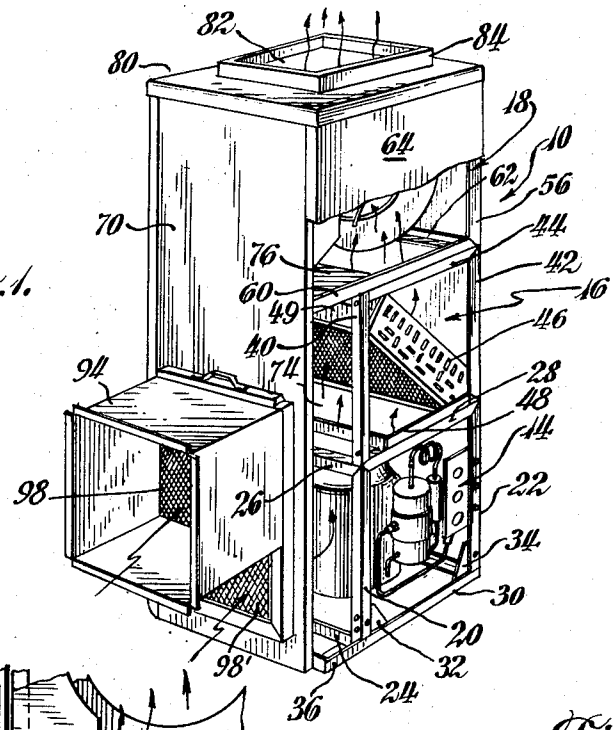


Fig. 4.

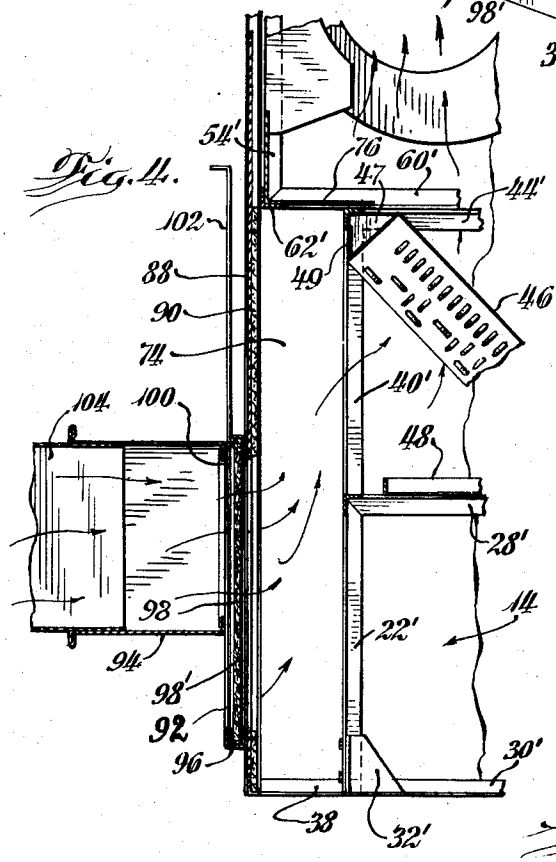
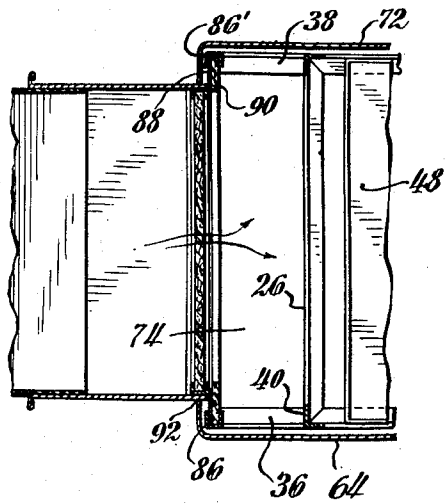


Fig. 5.



Inventor:
Seymour H. Blum
By Silverman + Mullin
Attorneys.

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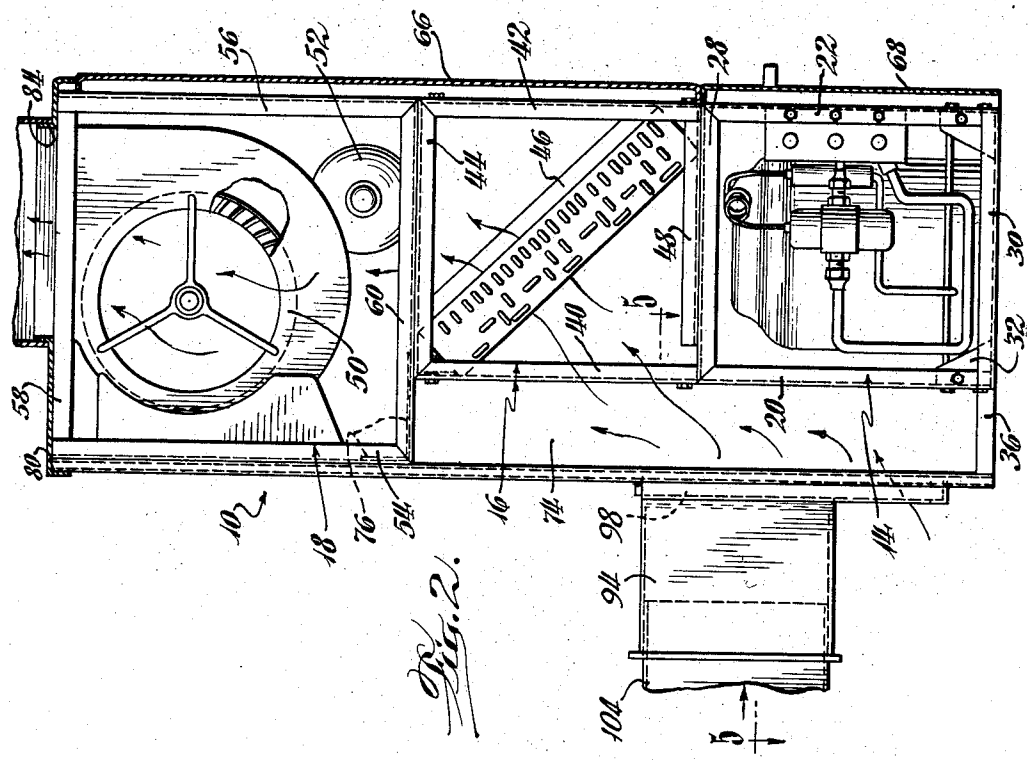

Fig. 2.

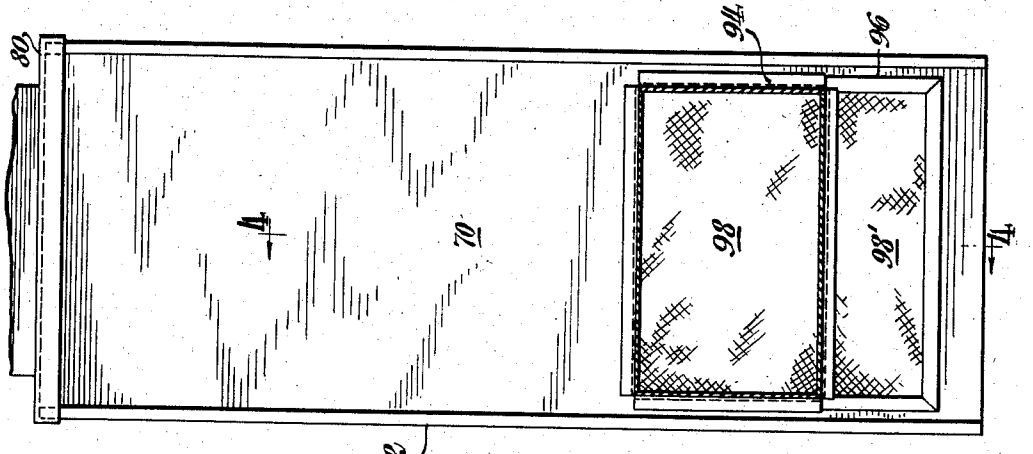

Fig. 3.

Inventor:
Seymour H. Blum
By Silverman & Mullin
Attorneys.

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AIR CONDITIONER UNIT

Seymour H. Blum, Chicago, Ill.

Application May 22, 1956, Serial No. 586,416

3 Claims. (Cl. 62—404)

This invention relates generally to an air conditioner unit and more particularly is concerned with the structure of a cabinet or housing for an air conditioner of the type which has substantially all of the major components, including the blower, evaporator, compressor, condenser, water regulator, and other equipment in the same housing.

The principal object of the invention is the provision of a novel and improved structure in which there is provided an entrance or mixing chamber within the housing in which air from one source, for example, the cold air return of a forced air heating system, and air from a second source, such as for example, the room, are intermingled prior to passing over the evaporator and out through the blower.

A further object of the invention lies in the provision of a novel structure in which the resistance to passage of air through the cabinet or housing is decreased, thereby enabling the increase in the size of the blower without waste of energy, and without the need for increasing the capacity or tonnage of the refrigeration system.

Another object of the invention lies in the provision of novel structure for supporting the blower in the cabinet.

Another object of the invention lies in the provision of novel structure for forming the mixing chamber and connecting the air inlets to the same.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel features of construction, arrangement and a combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of this invention, there is illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, this invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts throughout the several figures of the drawings:

Fig. 1 is a perspective view of the complete air conditioner unit but with the front panel partially broken away to show the structure.

Fig. 2 is a front elevational view of the air conditioner unit with the panel removed to show the construction of the interior thereof.

Fig. 3 is a side elevational view from the air intake side of the unit.

Fig. 4 is a sectional view taken generally along the line 4—4 of Fig. 3 and in the direction indicated.

Fig. 5 is a sectional view taken generally along the line 5—5 of Fig. 2 and in the direction indicated.

The air conditioner unit is designated generally by the reference character **10** and same is of the so-called cartridge type in which the various components may be arranged in sub-assemblies and assembled together in the cabinet for installation as an integral unit. Thus, the unit shown is made up of three sections or sub-assemblies which are designated **14**, **16** and **18**. The lowermost section **14** carries the heavier equipment, such as the compressor, water regulator, heat exchanger or condenser, electrical controls, and the like, all of which may be conventional and are shown somewhat diagrammatically in the drawings. The next higher section **16** comprises the evaporator section which is the heat exchanger providing direct exchange of heat between the air passing through the unit **10** and the coolant circulating in the refrigeration system. The top section **18** is the blower section which aids in driving air through the unit.

Although different manners of mounting may be utilized, in the example illustrated, each section is mounted in its own box-like framework of structural members, such as for example conventional angle-iron or channel members suitably braced and held together, and the whole assembled in the novel manner described hereinafter.

Referring now to Fig. 2, the lowermost section which may be termed the "compressor" section **14**, has vertical frame members **20** and **22**, transverse bracing members **24** and **26** (Fig. 1) and top and bottom horizontal framing members **28** and **30**. Similar opposite framing members are **28'** and **30'**. Obviously, since the frame supporting the compressor section **14** is of generally box-like formation there will be identical members which are not readily seen in the drawings. Vertical member **22'** may be seen in Fig. 4. The box-like formation is assembled by any suitable means such as bolts, brackets, welding or the like, and for example, the bottom corners are reenforced by gusset plates such as at **32**, **32'** and **34**, others of which may be used throughout the unit **10**.

For the moment, note that there is an extension **36** of the bottom horizontal framing member **30** which extends to the left as viewed in Fig. 2 a substantial extent. The extension **36** may be provided by means of any suitable bracket, or may be welded to the corner of the section **14**, or may even be integral with the member **30**. This latter expedient may be inconvenient where conventionally available compressor sections are used, since the manufacturer of the section may be required to make special parts.

A similar extension **38** is obviously on the opposite side of the unit **10**.

The evaporator section **16** is set into a box-like framework which includes vertical members **40**, **40'** and **42** which are aligned with the vertical members **20**, **20'** and **22** respectively; a top horizontal framing member **44**, and other framing members of angle iron or the like not requiring detailed description for the purpose of explaining the invention. The evaporator section **16** is rigidly mounted to the top of the compressor section **16** in any suitable manner. Horizontal framing members of both sections may be common. As noted, the evaporator section is of the so-called 45 degree angle type, and has a bank of coolant-carrying conduits **46** arranged crosswise from the upper left hand corner of section **16** to the lower right hand corner thereof (Fig. 2).

The bottom of the section **16** is substantially blocked by a drip pan **48** supported on the cross member **28** and its opposite mate. The left hand side of the section is open as is its upper side, but the presence of the bank of conduits **46**, which of course comprises the evaporator, blocks passage of air from the left side of the section

through the section and out the top. Triangular end gussets 47 and structural member 49 block small end openings and a narrow space between evaporator 46 and member 44'. The conduits of the evaporator 46 are set in finned structure as is conventional, so that as the air passes over the fins and conduits, there will be an exchange of heat between the air and the coolant through the fins and conduits. The arrows in Fig. 2 show the path of the air through the evaporator to the upper section 18.

The upper section 18, as has been indicated, houses a blower 50 driven by a motor 52 and is also formed in a box-like frame formed of vertical members 54, 54' and 56, horizontal framing members 58, 60' and 60, and transverse bracing members, such as shown at 62 in Fig. 1 and 62' in Fig. 4.

Heretofore, the housing for the blower has been chosen so that the length of the horizontal framing members 58 and 60 are equal to the length of the horizontal members 28, 30 and 44, so that the air passed directly upward from the evaporator section 16 to the blower, and there was no need for baffles of any kind.

In this invention, it will be seen that the length of the members 58 and 60 is such that there is a substantial overhang on the left (Fig. 2) over the other two sections. In enclosing the unit 10 with suitable panels, when the front panel 64, right side panels 66 and 68, left panel 70, and the rear panel 72 are installed as planar sides of the unit 10, there is a large entrance or mixing chamber 74 formed between the overhang of the section 18 and the left hand side of the sections 14 and 16. This chamber is suitably framed by means of additional structural members, such as for example, vertical stringers, cross braces, and the like, although, with the installation of the side panels, there is sufficient support provided by the portion of the blower section 18 that overhangs and by the extensions 36 and 38.

In order to prevent air from by-passing the evaporator 46, a baffle or similar plate 76 of substantially L-shaped cross section is secured over the top of the chamber 74, transversely of the unit 10, closing what would otherwise be an opening in the blower section 18, and also providing additional bracing and support for the framework.

The framework of the unit 10 is enclosed by means of panels, previously referred to, including the panels 64, on the front; 66 and 68 on the right hand side; 70 on the left side; and panel 72 on the rear. The panels are secured by any suitable fastening means to render them removable, or for example, only one or more of the panels may be removable. In the drawings, the left hand side of the device 10, which is covered by the panel 70 is provided with means to admit the air which passes through the device to be conditioned. In the ordinary installation, this might be considered the rear of the device, because access is most usually desired by way of the panels 66 and 68, which might be considered as the front.

The top of the device is covered by a capping plate or member 80 which is provided with flanges to engage the housing around the outside thereof and which is also provided with an opening 82 to enable the blower 50 to discharge its air into the ductwork served by the air conditioner 10, if ducts are used. Suitable coupling flanges 84 may be provided.

In the particular structure illustrated there are provided a pair of opposite vertical stringers 86 and 86' which connect between the extensions 36 and 38 respectively and the overhanging portion of the blower section 18. A metal back plate 88 and a plate 90 of insulating material such as felt or the like may be secured to the stringers 86 and 86' which conveniently are formed of channel-shaped structural members of conventional type. In the panel 70 across the same and adjacent the bottom thereof, there is provided a rectangular opening 92 which admits a short section of sheet metal conduit 94 into the major portion of the upper end thereof, leaving the bottom of the opening free. A sheet metal framework 96 is rectangularly formed and secured about the opening, the members thereof being of channel structure to admit of a vertically sliding filter 98 which, when in place, is interposed between the conduit 94 and the chamber 74 and is also interposed between the outside air and the chamber at the bottom of the opening 92.

A suitable slot 100 is provided for a damper to close off the conduit 94 which is normally connected permanently into the heating system of the ductwork of the building in which the unit is installed. In times when heated air traverses the ductwork, it is, of course, undesirable, and at least unnecessary, that hot air traverse the interior of the unit 10. Thus, in winter, for example, the damper 102 is in place.

The plate 88 and the insulating member 90 are perforated in alignment with the opening in the panel 70. Both extend substantially above the juncture between the blower section and the evaporator section 16 to prevent loss of air from the chamber 74.

It will be seen that air enters from the return duct 104 which is connected into the ductwork of the building, and passes through the filter 98 into the chamber 74. Simultaneously the blower draws air from the chamber 74 at a greater rate than can be supplied by the conduit 94 and hence air is drawn through the lower part of the opening 92 through the portion of the filter designated 98' and it commingles with the duct air in the chamber 74.

Through the structure described many advantages accrue which are not obvious and which are productive of increased efficiency of the apparatus. The presence of the chamber 74 prevents the immediate inrush of air from impinging against the equipment contained in the compressor section 14 and hence the resistance to passage of air through the device is decreased. Obviously the capacity of the air capable of being transmitted has increased, and thus the amount of air which is passed into the ductwork is better able to be distributed to cool the building or structure. It is believed that the added efficiency of the apparatus is also due to the inter-mixing of the return air from the duct 104 with the air from the basement coming in through the bottom of the opening 92 in the chamber 74. There may be a pre-cooling before subjecting the passing air to the exchange of heat in the evaporator.

In any event, the novelty of the structure lies in the provision of the chamber 74; the overhang of the section 18 because of its being larger than the sections 14 and 16; the novel baffle or bracket 76; and various of the other structural features which provide the advantages of the invention.

It is believed that this invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the specific details are nevertheless capable of wide variation within the purview of this invention as defined in the appended claims.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. An air conditioner cabinet of the type in which there is an assemblage of sections within a single cabinet, including a compressor section, an evaporator section, and a blower section, each section being generally box-like and having framing members supporting the same, the cross sectional configuration of the compressor and evaporator sections being rectangular and congruent and the last two sections being mounted one on top the other, and the blower section being also rectangular in cross section but larger in one direction and mounted on top the other two whereby there is an overhang, means enclosing the

assemblage including side panels and a top panel containing the air within the cabinet and forming substantially a monolithic form, there being a chamber beneath said overhang but outside said compressor and evaporator sections, an inlet in one side panel leading to said chamber and an outlet in the top panel leading from the blower section, and a substantially L-shaped cross-section bracket secured at the overhang and blocking passage of air directly from the chamber to the blower section.

2. An air conditioner cabinet of the type in which there is an assemblage of sections within a single cabinet, including a compressor section, an evaporator section, and a blower section, each section being generally box-like and having framing members supporting the same, the cross sectional configuration of the compressor and evaporator sections being rectangular and congruent and the last two sections being mounted one on top the other, and the blower section being also rectangular in cross section but larger in one direction and mounted on top the other two whereby there is an overhang, means enclosing the assemblage including side panels and a top panel containing the air within the cabinet and forming substantially a monolithic form, there being a chamber beneath said overhang but outside said compressor and evaporator sections, an inlet in one side panel leading to said chamber and an outlet in the top panel leading from

the blower section, the inlet to the chamber including an opening adapted to be connected into ductwork external of the cabinet and a second opening to the exterior of the cabinet to admit air from a different source, the chamber serving to mix the air before passing same through the evaporator section, a baffle plate covering the overhang portion of the blower section on the bottom thereof to prevent entrance of air from the chamber and force the same to pass through the evaporator section, and structural means framing said chamber including members connected to the bottom of one of said compressor and evaporator sections.

3. A structure as claimed in claim 2 in which the compressor section is on the bottom and the evaporator section includes a diagonal evaporator closing the same off with means to pass air therethrough so that all air passing from the chamber to the blower must traverse the evaporator.

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