April 15, 1969 R. L. BRUGLER 3,438,219

ROOM AIR CONDITIONER

Filed Aug. 14, 1967 Sheet 1 of 6

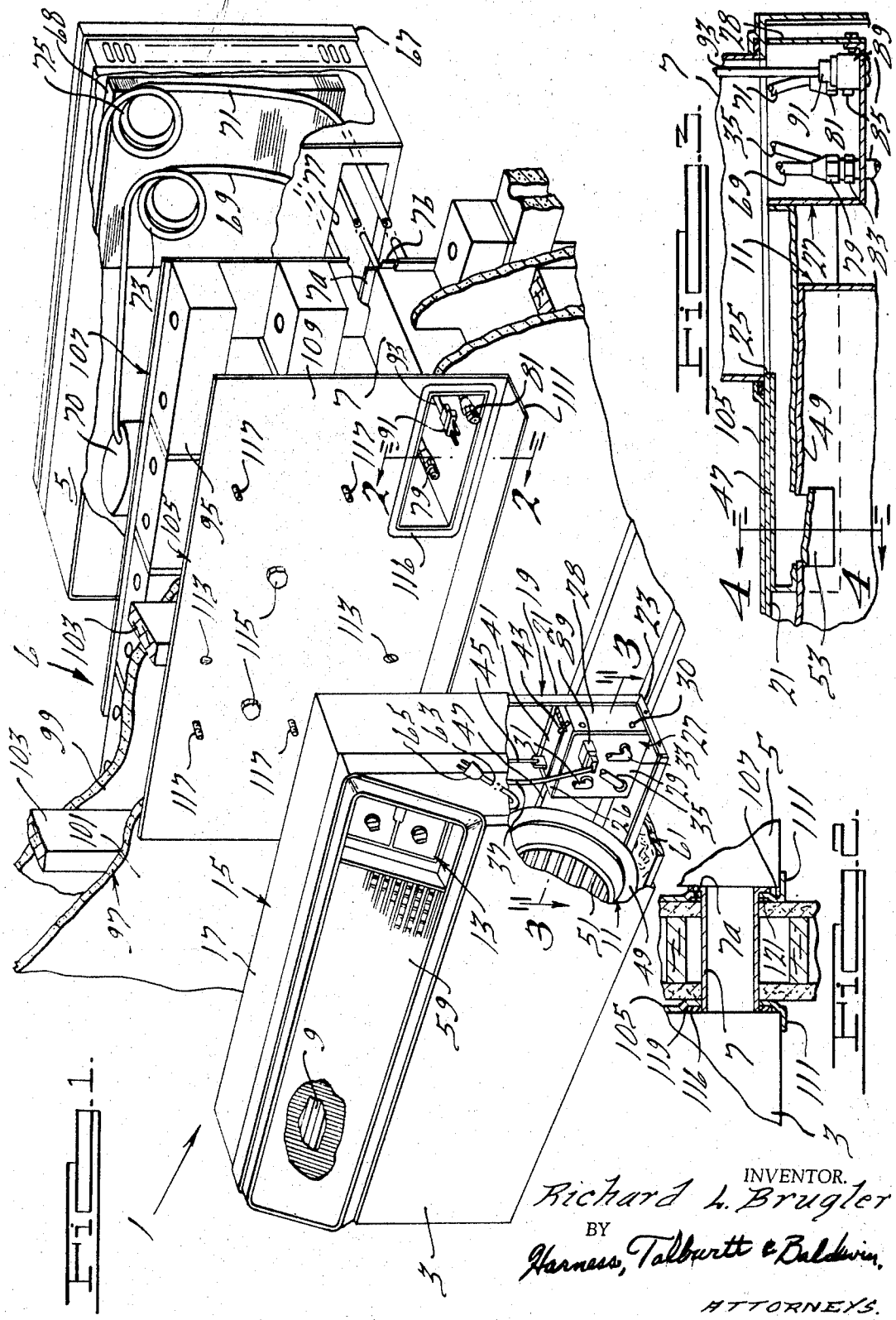


Fig. 1.

Fig. 2.

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ROOM AIR CONDITIONER

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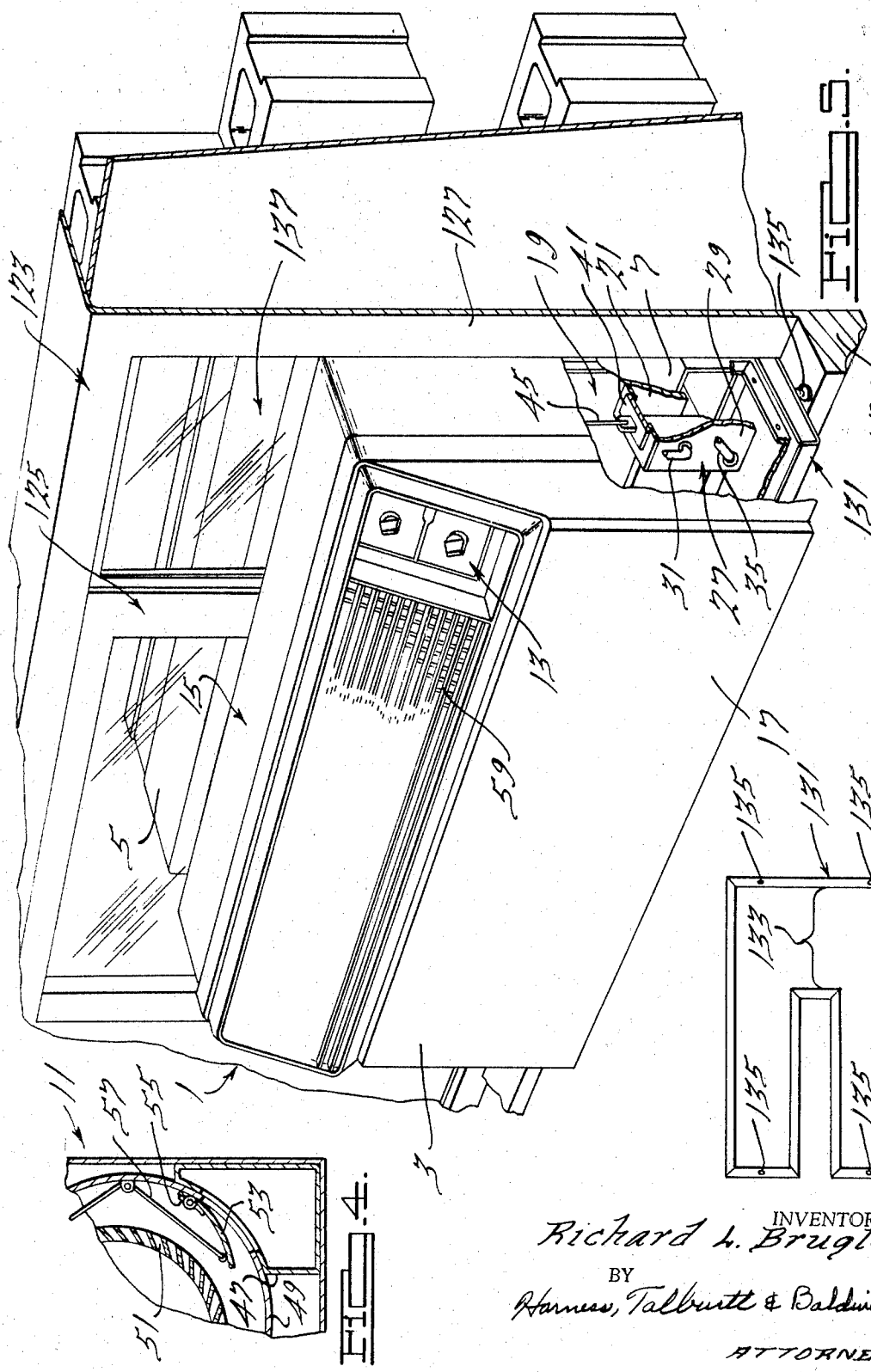


Fig. 5.

Fig. 6.

Fig. 4.

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ROOM AIR CONDITIONER

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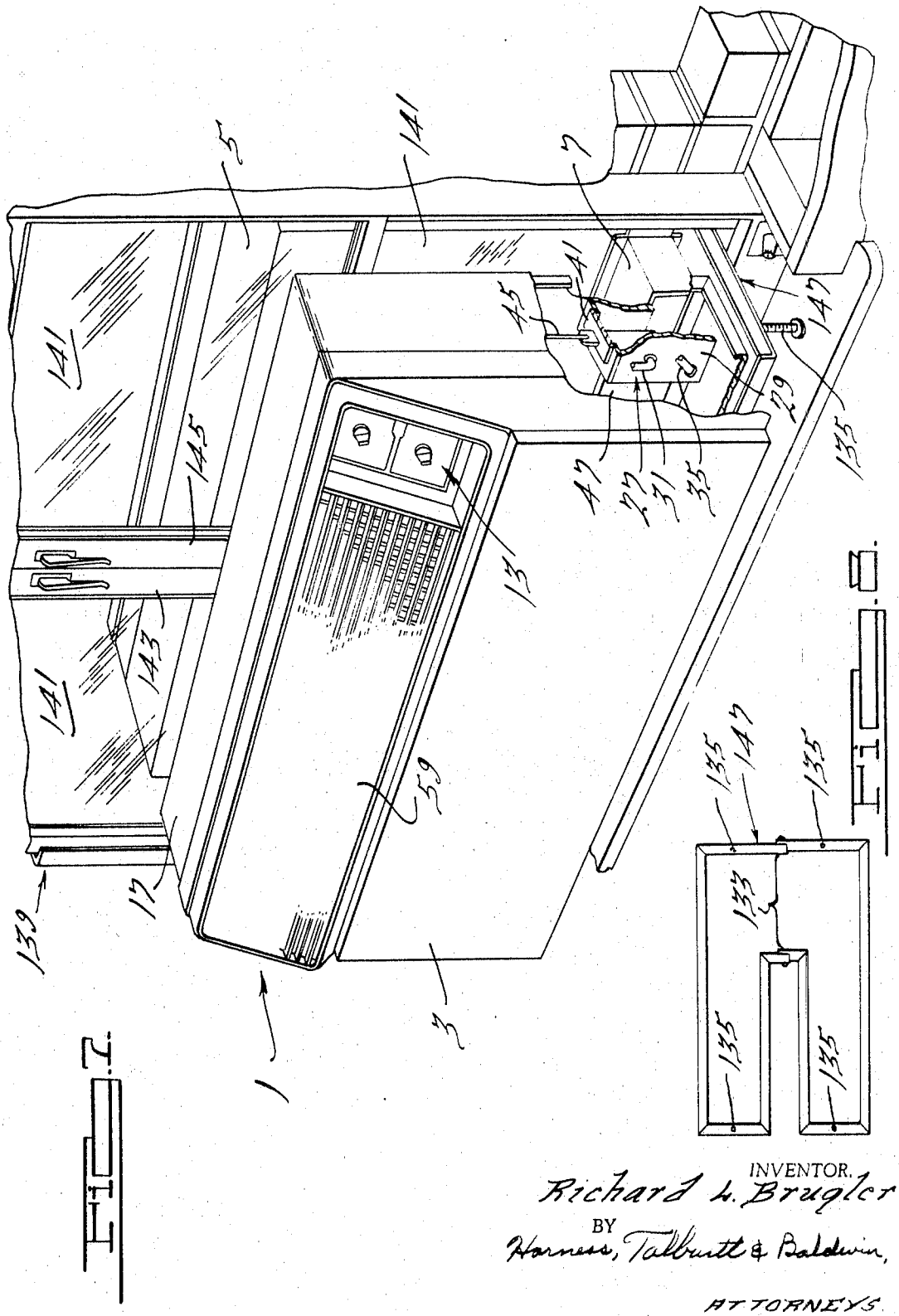


FIG. 1

FIG. 2

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ROOM AIR CONDITIONER

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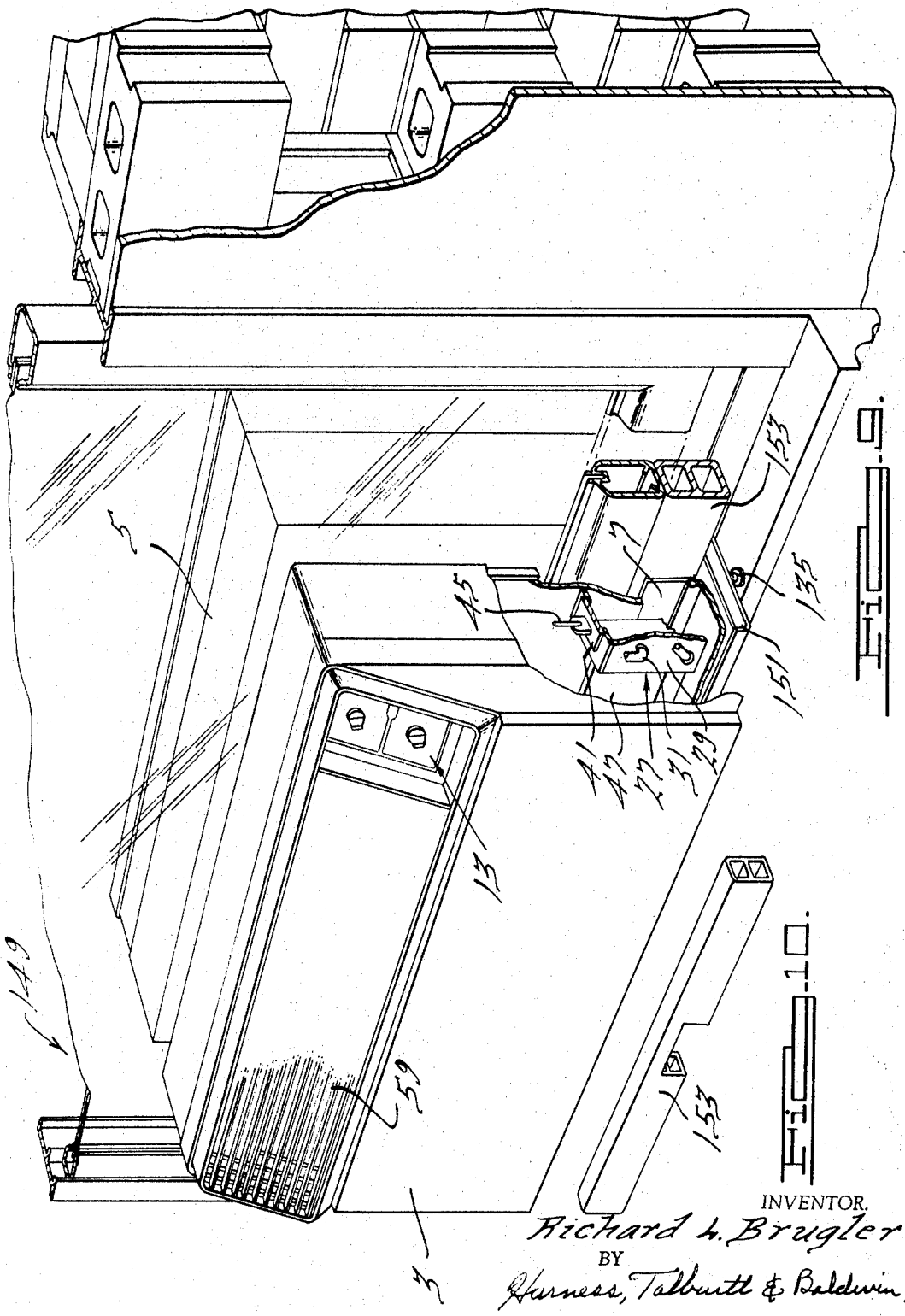


Fig. 9.

Fig. 10.

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April 15, 1969 R. L. BRUGLER 3,438,219

ROOM AIR CONDITIONER

Filed Aug. 14, 1967 Sheet 5 of 6

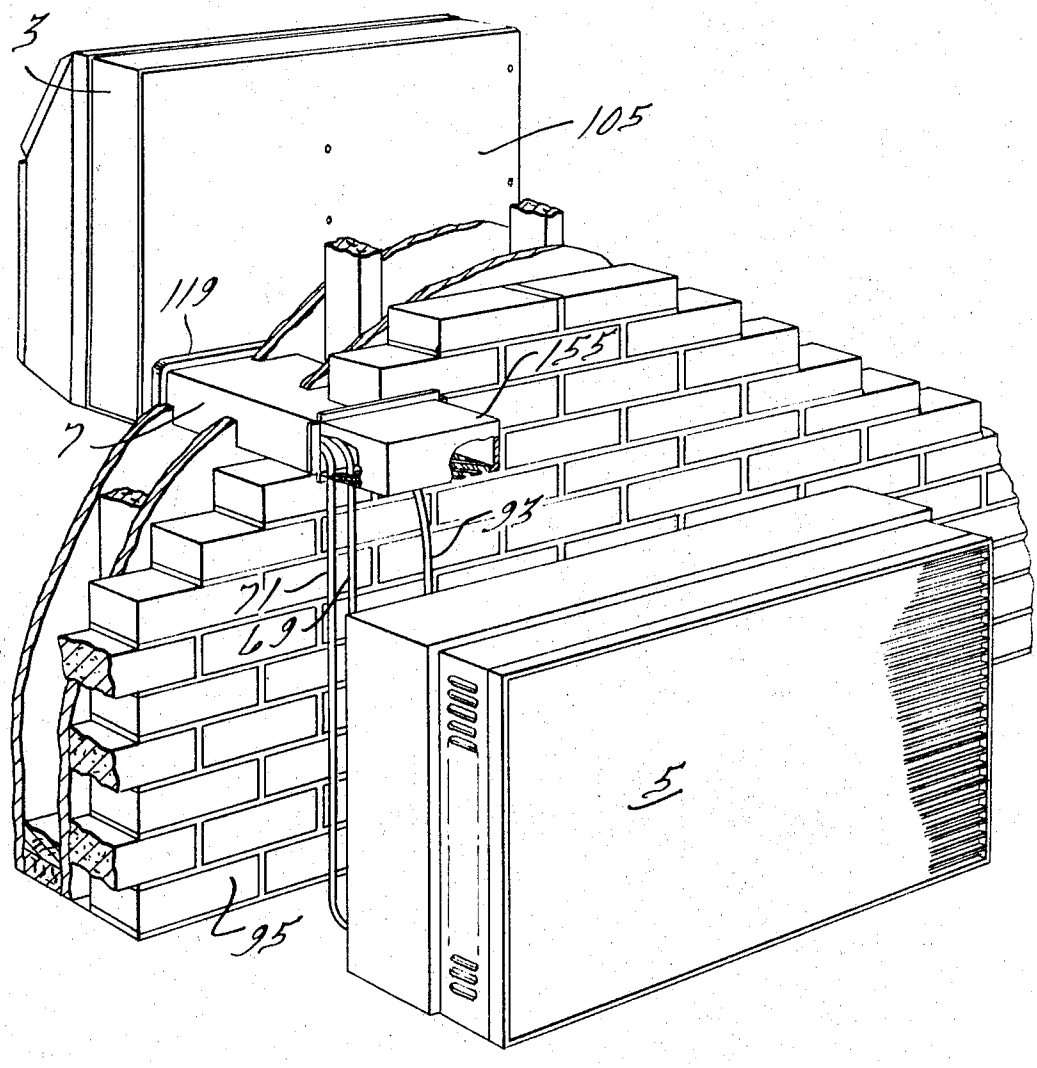


Fig. 11.

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ROOM AIR CONDITIONER

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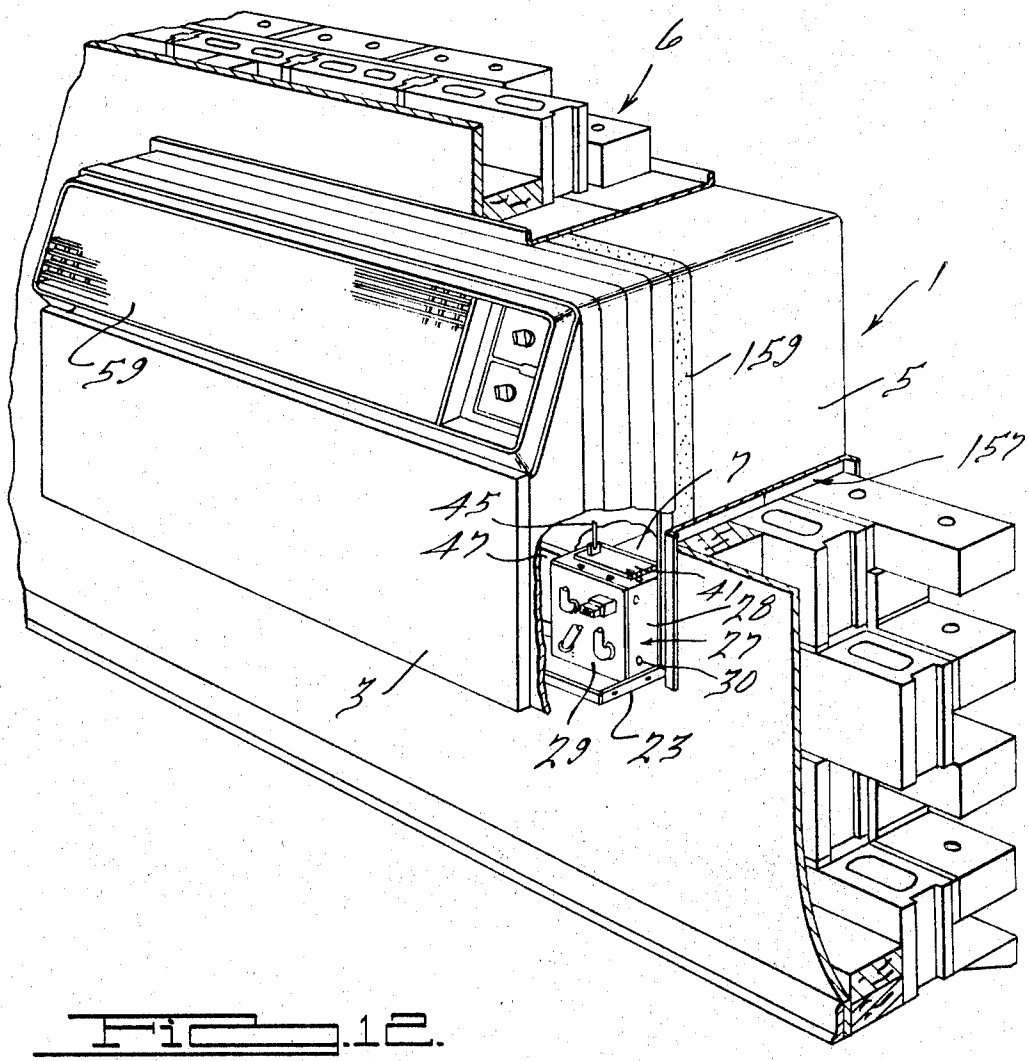


Fig. 12.

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United States Patent Office

3,438,219

Patented Apr. 15, 1969

3,438,219

ROOM AIR CONDITIONER

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Filed Aug. 14, 1967, Ser. No. 660,248

Int. Cl. F25d *19/02*; F24f *1/02*

U.S. Cl. 62—262 10 Claims

ABSTRACT OF THE DISCLOSURE

Air conditioning unit including an indoor-evaporator section and an outdoor condenser-compressor section, the sections being joined by a connector-duct through which refrigerant lines, fresh air, exhaust air, electrical power, and condensate drain lines are adapted to pass, the duct being adaptable for installation through walls of various thicknesses and through various types of windows and window openings. The indoor unit includes a transfer box in communication with the duct, the box housing refrigerant and electrical lines and connection fittings for joining refrigerant and electrical lines passing through the connector duct. Another transfer duct extends between a portion of the inside end of the connector duct and the housing of the blower in the indoor section. Movable doors on the transfer duct and the blower housing permit the ingress of fresh air from the outside or the egress of exhaust air from the indoor unit to the outside.

Background of the invention

This invention relates to refrigerating apparatus, and more particularly to room air conditioning apparatus.

One type of room air conditioning unit is conventionally constructed to allow installation thereof in a window with one portion of the unit mounted on the inside of the room and another portion extending away from the first mentioned portion through the window opening to the outside of the building. Normally, if the unit is placed in a window, the window sash is lowered until it rests on the top of the air conditioning unit. The spaces between the window frame, sash and unit are closed with filler boards placed therein. There are several disadvantages to these units, such as for example: the noise of the outside condenser is usually audible inside the room; some window light is blocked out by the window raised over the unit; and air leakage around the unit and the filler boards may lessen the effectiveness of the unit and permit cold air leaks in winter.

Another type of room air conditioner unit comprises a cabinet, housing the air conditioning components, and extending directly through a hole in the wall. This so-called through-the-wall type of unit has an advantage over the window type units in that no window light is blocked with the through-the-wall unit. However, an opening substantially the same size as the cabinet must be made completely through the wall. This is time consuming, expensive, and in some cases may require a weakening of the wall structure. For example, one or more vertical studs may have to be cut in a frame or brick veneer-frame wall to install the unit.

Some window type units have been particularly designed and constructed for installation in casement type windows, and still other types of units have been designed for so-called sliding windows which slide horizontally on tracks.

In the past each different type of room air conditioning unit usually had to be designed and constructed for a different particular type of installation, i.e. double-hung window, horizontal sliding window, casement window, and through-the-wall, for example. This naturally meant that manufacturers had to design and tool for several different types of units for several different types of installation, resulting in substantial expense. Recently, the so-called split room unit, i.e., a unit which has an air space between substantial portions of the indoor (evaporator) and outdoor (condenser) sections thereof, has gained favor in the industry. These units were particularly applicable to double-hung window installations. Such units permit the windows to be moved to a more nearly completely closed position, thus reducing the audible indoor noise of the outdoor section, and also reducing the space filled with filler panels. However, different types of units are normally required for double-hung and sliding window installations. Moreover, such units have not been readily adaptable to through-the-wall or casement window installations. These units have conventionally been of the factory or pre-charged type, i.e., the refrigerant has been placed in the complete system at the factory, so that the indoor and outdoor sections were shipped and installed as a single unit. In any event, the costly multiple design and tooling work attributed to the various different units for multiple installation possibilities has not been alleviated any significant amount by the advent of the split room type of unit.

The above objections have been substantially reduced or eliminated by the present invention.

Summary of the invention

Briefly, an air conditioning unit of this invention comprises an indoor section adapted to be mounted adjacent the inner side of a separating structure and outdoor section adapted to be located outside the separating structure, first refrigerating apparatus in the indoor section, second refrigerating apparatus in the second position, a sleeve adapted to extend from one corner of the indoor section through the separating structure, and refrigerant lines adapted to extend from one section to the other through the sleeve.

One of the primary objects of this invention is to provide an air conditioning unit adapted to be installed in any one of several different types of installations with a minimum of installation apparatus and without extensive modification of the air conditioning unit or the separating structure.

Another object of this invention is to provide an air conditioning unit of the class described which may be quickly and inexpensively installed in any one of several different types of installations by merely selecting the proper installation kit for the particular type of installation, and then utilizing the selected kit in following simple installation instructions.

A further object of this invention is to provide an air conditioning unit such as described which requires only a very small opening in the separating structure for proper installation of the unit.

Still another object of this invention is to provide an air conditioning unit of the type described which permits fresh air to be drawn in from the outside or permits inside air to be exhausted to the outside without the use of separate air ducts through the separating structure.

Still a further object of this invention is to provide an air conditioning unit of the class described which is read-

ily adaptable for installation through different separating wall structures of varying thicknesses.

Another object of this invention is to provide an air conditioner such as described which substantially reduces the design and tooling costs in relation to the number of different types of installations to which this unit is applicable.

Another object of this invention is to provide an air conditioner of the type described which is versatile and economical, and effective in operation.

Other objects and advantages will be made apparent as the description progresses.

Brief description of the drawings

In the accompanying drawings, in which several of the various possible modifications of this invention are shown:

FIG. 1 is an expanded trimetric projection of an air conditioning unit of this invention in a through-the-wall installation, certain parts being broken away and removed for clarity;

FIG. 2 is a section taken generally along line 2—2 of FIG. 1, certain parts being removed for clarity;

FIG. 3 is an enlarged section taken generally along line 3—3 of FIG. 2;

FIG. 4 is a section taken generally along line 4—4 of FIG. 3;

FIG. 5 is a trimetric projection of an air conditioning unit as shown in FIGS. 1–4 adapted for installation in a sliding window;

FIG. 6 is a plan view of a frame adapted to support the unit shown in FIG. 5;

FIG. 7 is a trimetric projection of an air conditioning unit of this invention installed in a casement window installation;

FIG. 8 is a plan view of a frame which may be used for installing the air conditioner unit in the casement window installation shown in FIG. 7;

FIG. 9 is a trimetric projection of an air conditioning unit of this invention installed in a double-hung-window installation;

FIG. 10 is a perspective view of a filler member used in the FIG. 9 installation;

FIG. 11 is a trimetric projection of an air conditioning unit of this invention mounted in a through-the-wall installation with a remote condenser or outdoor unit; and

FIG. 12 is a trimetric projection of an air conditioning unit constructed in accordance with this invention, installed in a through-the-wall installation wherein the unit per se extends through an opening in the wall.

Like parts are indicated by corresponding reference characters throughout the several views of the drawings.

Description of the preferred embodiments

Referring now to the drawings, and to FIG. 1 in particular, an air conditioning unit **1** is generally shown to comprise an indoor section **3** and an outdoor section **5** adapted to be connected together on opposite sides of a separating structure **6** by a duct **7**. As will be made apparent, duct **7** is constructed so that it can be modified to permit the unit **1** to be installed in a number of different installations through separating structures of various thicknesses and constructions.

Indoor section **3** includes an evaporator coil **9**, a blower or fan unit **11** and controls **13**, all mounted in a cabinet or housing **15** formed of a removable casing **17** and a support member **19**. Support member **19** is provided with a back portion **21** and an outwardly extending foot portion **23** along the lower edge of the back **21**.

A generally rectangular opening **25** (FIG. 3) is formed in the back portion **21** adjacent one of the lower corners thereof. Extending across a portion of opening **25** on the inside of back portion **21** is a transfer box **27** having one side open and adjacent the opening **25**. One side face **28** and the top **26** are removably attached to the box **27** by screws **30** for a purpose to be made apparent hereinafter. The side face **29** opposite opening **25** is formed to receive a refrigerant suction line **31** connected to the evaporator outlet,a refrigerant liquid line **33** connected to the evaporator inlet, a condensate drain tube **35** and an electrical line **37**. The function of these components will be made apparent hereinafter.

The upper surface **26** of box **27** has an opening covered by a door **41** pivotally attached to the box. The door is spring biased by a spring **43**, but may be opened by means of a cable **45** connected between the outer end portion of the door and a suitable control mechanism (not shown). It will be seen that opening of door **41** places the interior of the casing **17** in communication with the opening **25** inside box **27**. The portion of opening **25** outside box **27** is covered by a transfer duct **47** extending from box **27** to the center portion of a housing **49** of blower unit **11** surrounding a centrifugal fan **51**. Housing **49** has an opening therein covered by a door **53** pivotally connected at one end to the housing **49** (see FIG. 4). A spring **55** normally biases the door toward a closed position. An actuating cable **57** extends between the free end of the door **53** and a suitable control mechanism (not shown) for opening the door **53** thereby placing the opening **25** in communication with the interior of blower housing **29**. It will be understood that fan **51** pulls air inwardly through its open ends and discharges the air outwardly over the evaporator coil **9** and through an outlet **59** (FIG. 1). The air is pulled into the fan **51** either through a filter **61**, or as made apparent hereinafter, through duct **7**. Electric power power is supplied to the air conditioning unit **1** through an electrical line **63** having a wall plug **65** on the end thereof.

The outdoor section **5** comprises a cabinet or housing **67** having a condenser or condensing coil **68**, a fan and motor therefor (not shown), and a compressor **70** mounted therein. A suction line **69** is connected at one end thereof to the compressor and a liquid refrigerant line **71** is connected at one end thereof to the condenser outlet. Both lines **69** and **71** are looped as indicated at **73** and **75**, respectively, and pass through a generally rectangular opening **77** in the back of cabinet **67**. As will be made apparent, the loops **69** and **71** provide a built-in reserve supply of refrigerant line for compensating for variations in the thicknesses of the wall structures through which the unit may be mounted.

The duct **7** for joining the indoor and outdoor sections **3** and **5** is preferably formed of sheet metal and has transverse cross sectional dimensions approximately equal to the length and height of a conventional residential building brick, i.e., approximately 8 inches long by 2¼ inches high. As used herein the term residential building brick means a brick having the aforementioned approximate dimensions. The purpose of a duct of this size, as will be seen, is to permit installation of the duct through a brick wall by removing or omitting only one brick. The duct, prior to installation, preferably has a length sufficient to extend through a relatively thick wall with some overhang on each side of the wall. The overhang may be flanged or turned back on one or both sides of the wall for stabilization of the duct and attachment to the indoor and outdoor sections as will be made apparent. If the air conditioning unit is to be mounted in a relatively thin wall, or in a window for example, a portion of the duct on the inside is merely cut off at the installation site to provide a duct of the proper length. The duct opening and the opening in the back side of each section **3** and **5** are adapted to register with one another as will be made apparent.

The ends of refrigerant suction line **69** and the refrigerant liquid line **71** are provided with fitting **79** and **81**, respectively, of quick connect couplings which are adapted to mate with fittings **83** and **85** (FIG. 3) on lines **31** and **33** within transfer box **27**. Electrical line **37** extends from the controls **13** to a receptacle **89** mounted in box

27. A plug 91 on the end of an electrical line 93 connected to the power equipment for the compressor and condenser fan (not shown) is adapted to be plugged into receptacle 89.

The particular separating structure or wall 6 shown in FIG. 1 comprises an outside brick wall portion 95 and an inside supporting wall portion 97 formed with two sheets of siding 99 and 101 separated by timbers or studs 103. However, it will be understood that other types of walls, such as frame, cement block, or tile walls, for example, are equally receptive of the unit of this invention.

Mounting plates 105 and 107 are provided for mounting the indoor and outdoor sections 3 and 5 adjacent wall 6. Each mounting plate has a generally vertically extending back portion 109 adapted to be located adjacent wall 6, and a generally horizontally extending shelf portion 111 extending away from wall 6. The back portions each have rectangular openings preferably located in one lower corner thereof for receiving duct 7 and are adapted to be aligned with the rectangular openings 25 and 77 in the sections 3 and 5. While the rectangular openings are preferably located in one of the lower corners of the back portions of the sections, the openings could be at other locations on the back portions, if desired, as long as the lower edges of such openings are below the lower edge of the evaporator coil 9 so that condensate from the latter may drain by gravity through tube 35 to the outdoor section. The mounting plates are adapted to be connected to wall 6 by fasteners, such as screws 113, for example. In addition, one or more bolts 115 extending completely through both mounting plates and walls may be provided for securely attaching the mounting plates to the wall.

A plurality of studs 117 extend away from the mounting plates for securing the indoor and outdoor sections thereto. The studs 117 are preferably threaded for receiving clamping nuts (not shown). Mounting plate 105 may be recessed around the rectangular opening therein as indicated at 119 in FIG. 2, while mounting plate 107 may be recessed as indicated at 121.

In the embodiment described above and in the embodiments described hereafter various mounting kits are utilized for installation of the unit in various types of installations. However, in every case the unit comprising the indoor section 3, the outdoor section 5, and the connecting duct 7 is utilized by modifyng the length of the duct 7 to the particular application. For example, installation of the unit 1 in a wall 6 as shown in FIG. 1 may be accomplished in the following manner:

First, the desired location of the unit is selected. It is desirable, but not essential, that the selected location is such that the rectangular openings in the back portions 109 of the mounting plates will be positioned so that one brick may be removed from the outside wall 95. After this position is selected, the brick may be removed and a corresponding hole in the wall 97 may be cut. The duct 7, which at this point should be longer than necessary to pass through wall 6, is formed at one end with flanges 7*a* and 7*b*. The flanges 7*a* and 7*b* are secured to the outside face of recess 121 of mounting plate 107 with metal screws, for example. The mounting plate 107 is then placed in position on the outer side of brick wall 95 with the duct 7 being guided through the hole formed in the brick wall 95 and the inner wall 97. The inside mounting plate may be installed by first sliding it over the inner end of the duct 7 which is extending into the room and then fastening screws 113 and bolts 115 if desired. Sealing material, such as a rubber seal or collar 116 for example, may be provided around the rectangular opening to seal the opening. The inner end of duct 7 may then be cut off so that the end of the duct is either substantially flush with the inner face of back portion 109 or so that only a small amount, such as ⅛"–¼" for example, of the duct extends inwardly beyond the back portion 109 of plate 105. It will also be understood that the duct 7 could be cut to the desired length prior to its insertion through the wall 6. It will be understood that suitable holes will be provided or may be drilled in plate 107 for receiving screws or other fasteners.

Next, the free ends of the refrigerant suction line 69, liquid refrigerant line 71, and the plug 91 are grasped and pulled through opening 77 in the outside section 5 until they have an extended length sufficient to reach through the wall 6 to the inside thereof. It will be seen that the loops 73 and 75 in the lines 69 and 71 provide a reserve of line from which the lines can be drawn for extending them to the desired length. Obviously, the loops are made large enough so that the lines can be extended away from the outdoor section 5 by a length at least equal to the maximum length of duct 7 without causing the lines 69 and 71 to crimp or be ruptured.

The outdoor section 5 is then mounted on shelf 111 of plate 107 and the section is attached to the mounting plate. It will be understood that the outer portion of the cabinet 67 may have to be removed to permit access to the studs 117 on plate 107 with clamping nuts.

The casing 17 of cabinet 15 is next removed to expose the internal components of indoor section 3. The support member 19, and the internal components attached thereto, are then placed on the shelf 111 of mounting plate 105 and the support member is secured to the mounting plate by tightening clamping nuts on the studs 117 which extend through the back portion 21 of support member 19.

It will be understood that suitable sealing material such as foam rubber for example, is placed between the outlets of duct 7 and the adjacent parts of the unit so that air leakage is kept to a minimum.

The screws 30, the side face 28 and top 26 of transfer-box 27 are now removed and side face and top are removed to expose the adjacent ends of the refrigerant lines. The quick connect coupling fittings 81 and 85 are connected together and plug 91 is connected into receptacle 89. The free end of the condensate drain tube 35 may be guided through the duct 7 until it has reached the outdoor unit 5. The side face 28 is then replaced and the casing 17 reattached to the support member 19. Assuming the refrigerant lines and other parts of the refrigerant circuit have been precharged with refrigerant, the air conditioning unit is ready for operation as soon as plug 65 is inserted into a wall socket.

It will be seen that the air conditioning unit may be quickly and easily installed in a through-the-wall installation. Moreover, both the indoor section and the outdoor may be individually and easily serviced. The duct 7, with its variable length characteristics, allows the unit to be adaptable to attachment to walls of various thicknesses. Moreover, the duct 7, transfer box 27 and transfer duct 47, with the associated doors 41 and 53, permit fresh air to be brought into the inside and also conveniently permits air to be exhausted to the outside. Fresh air is brought into the inside by actuating the controls 13 to cause the cable 45 to open door 41. Since the door 41 and its opening are close to fan 51, air is pulled from the outside through duct 7, transfer box 27, and the opening in the upper face of the box into the fan which forces the air over the evaporator coil and into the room. If it is desired to exhaust air from inside the room the door 41 is closed and the controls 13 actuated to open door 53. This causes inside air to be forced through the opening of door 53, along the transfer duct 47 and through the duct 7 to the cabinet 67. Suitable openings are of course provided in cabinet 67 to permit the ingress and egress of air.

It will be seen that the duct 7 is in effect, multifunctional in that it facilitates installation of unit 1 in walls having different thicknesses and also permits the ingress of fresh air and the egress of exhaust air. Thus far, the versatility of the air conditioning unit has been described only with regard to through-the-wall installation. How-

ever, the versatility of the unit for other types of installations will now also be described.

In FIG. 5 the unit is shown installed in a so-called sliding window unit **123**. Unit **123** has a horizontally sliding window **125** slidable on tracks in a frame **127**. An interior sill **129** and an extension sill (not shown) are provided. The kit for installing the inside unit **3**, outside unit **5** and duct **7** includes a generally U-shaped angle iron frame **131**.

Frame **131** may be formed of a plurality of separate pieces welded or bolted together. The narrow neck portion **133** is substantially the same width as the duct **7**. Suitable leveling and adjusting feet **135** are connected to the frame and adapted to rest on the frame and adapted to rest on the sills **129** for supporting the frame **131** and air conditioning unit **1**.

The unit **1** may be installed in a sliding window in the following manner.

First, frame **131** is placed in position straddling the sliding window instead of a wall are to replace the inside and outside legs of the frame to level the latter. The flanges **7***a* and **7***b* (see FIG. 1) of duct **7** are attached directly to the inner wall of the outside section **5** by metal screws, for example. Since the sections **3** and **5** will be relatively close together after installation, i.e., since they will be separated only by the thickness of the sliding window or windows, a substantial portion of the duct **7** originally provided can be cut off, thereby leaving a short duct extending inwardly from the outside section **5**. The indoor section may be mounted on frame **131** with the rectangular opening in the back thereof aligned with the inner end of the duct **7**. Suitable sealing gasket material is provided for sealing the duct **7** and back of the indoor section against air leakage. A filler, such as a sheet of clear rigid plastic material **137** is inserted in the space between sliding window **125** and the frame **127** over duct **7**. The operation of the air conditioning unit is exactly like the unit described with reference to FIGS. 1–4. The only changes required to install the unit in a sliding window instead of a wall are to replace the mounting plates **105** and **107** with a supporting frame **131**, and add a filler member **137**.

In FIG. 7 the air conditioning unit **1** is shown installed in a casement window unit **139** having a plurality of window panes **141** in frames **143** and **145**. The lower pane **141** in one frame is removed and the duct **7** extends through the opening. The duct may be connected to the sections **3** and **5** in the same manner as shown in FIG. 5, i.e., with metal screws. The opening resulting from removal of one pane of glass above the duct **7** may be closed by the insertion of a suitable filler panel.

The mounting frame **147**, shown in FIG. 8, is similar to the frame **131** shown in FIG. 6, but frame **147** is constructed in two pieces separable in the narrow portion **133**. Ordinarily, it would be possible to use a frame like frame **131**, i.e., a unitary structure, in a casement window, by first swinging the window frame **145** to an open position. The unitary U-shaped frame may then be placed in position by inserting it so that the legs thereof straddle the outer edge of the window frame. The window frame is then closed and the legs are swung back down to a generally horizontal position with the adjustable feet **135** resting on the window sills.

If, for some reason, it is impossible or difficult to utilize a unitary U-shaped frame **131** for mounting the unit in a casement window, the frame **147** may be used. Since this frame is separable, is is unnecessary to open the window frame **145** during installation of the unit. The two halves of frame **145** are simply attached together through the opening in the window frame. It will thus be seen that the unit **1** of this invention may be readily installed in a casement type window, as well as in a sliding window and in a through-the-wall installation.

In FIG. 9 the air conditioning unit **1** is shown installed in a double hung window **149**. The mounting frame for the unit **1** may comprise a supporting member or plate **151** adapted to extend across the window opening with adjusting feet **135** extending downwardly into engagement with the inner and outer sills. A filler strip **153** cut to the required dimensions is adapted, upon lowering of the lower window sash, to seal the opening against air leakage. The indoor section **3**, and the outdoor section **5** are joined together with duct **7** in the same manner as the unit shown in FIG. 7, for example.

FIG. 11 depicts the unit **1** installed in a so-called through-the-wall remote application. In this embodiment, the indoor section **3** is attached to a mounting plate **105** in the same manner as the unit illustrated in FIG. 1. The outer end of duct **7** is flanged against the outside of the wall **6**. The outdoor unit is shown as being located on the ground, but it will be understood that it could be located on blocks or a ledge, for example, if desired. The refrigerant lines **69** and **71**, and the electrical line **93** may not be long enough to extend upward along the wall **95** to duct **7** and then through the duct to the transfer box in section **3**. Accordingly, when the unit is to be installed in this type of installation, pre-charged refrigerant extension lines having valves on opposite ends thereof, and an extension cord may be employed between the refrigerant lines **31** and **69**, **33** and **71**, and electrical lines **37** and **93**. A guard or cover **155** is telescoped in to the outer end of duct **7** to prevent small rodents and the like from entering duct **7**. It will be seen that in this application the air conditioning unit comprises the same three pieces, i.e., sections **3** and **5**, and duct **7** plus a few installation and mounting pieces. This type of installation is particularly well suited for mobile homes, for example, where it is desirable to keep the weight carried by the walls to a minimum. However, this type of installation is also quite applicable for any structure wherein it is desirable for any reason, such as weight considerations, or appearance considerations, for example, not to have the outdoor unit on a wall, but rather to have the outdoor unit located on the ground or the roof. For example, one or more units could be mounted in a window or through-the-wall in the second story of a building, with the outdoor unit or units being located on the ground and connected to the indoor units by refrigerant extension lines and electrical extension lines.

Another type of through-the-wall installation is shown in FIG. 12. In this arrangement a hole is cut in the wall **6** approximately the same size as the air conditioning unit **1**. A two-piece sleeve **157** is inserted in the hole and the sections **3** and **5** fit within the sleeve **157**. The duct **7** extends between and is connected to the sections **3** and **5**, in the same manner as the sleeve shown in FIGS. 5, 7 and 9, for example. An insulation board **159** is provided between sections **3** and **5** to reduce the transmission of noise from the outside section to the room interior.

The above description sets forth several of the different types of installation applications to which the air conditioning unit of this invention is adaptable. Obviously, this unit could be installed in other types of installations without varying from the scope of the invention. The unit is adaptable to these various installations without extensive modifications, and eliminates the cost of manufacturing separate units for each different application. The size of the duct or sleeve **7** is an important feature of this invention since only one brick need be removed from a brick wall to enable installation of the unit therein. Moreover, the transfer box **27** and duct **7** permit the passage of fresh air into the indoor unit, or the exhaust of air from inside the room (through duct **47**) in addition to their function of providing a passage for the refrigerant lines, electrical line and condensate line from one section to the other.

Furthermore, while various types of kits have been shown and described for installation of the unit **1** in double-hung, sliding, and casement windows, for example, it will be under stood that one composite kit could be

supplied with which any of the various types of installations could be accomplished. Moreover, the unit is not limited to very low B.t.u. rated air conditioners, but may have a relatively high room air conditioner rating, such as 12,000 B.t.u., for example.

It will be understood that, if desired, a suitable heating mechanism, such as an electrical resistance coil, or a steam or hot water coil, for example, could be installed in front of the fan **11** in the indoor section **3** so that the section could be used to provide heat during cold weather.

In view of the foregoing it will be seen that the several objects and other advantages of this invention are obtained.

Although several of various possible embodiments of the invention have been disclosed and described, it is apparent that other embodiments and modifications of the invention are possible within the scope of the appended claims.

I claim:

1. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, said duct having a transverse cross section dimension approximately equal to the length and height of a residential building brick, said first housing having an opening in one side thereof adapted to register with said duct, said first housing including a box therein having one side open and aligned with said opening, said box having one wall through which the free end portions of said first and second refrigerant lines pass, said indoor section, including an electrical line having one end supported by said box, said indoor section also including a condensate drain line adapted to provide a passage for the condensate from said evaporator, said condensate line passing through said box and adapted to pass through said duct to said outdoor section, said fan having a fan housing therearound, said indoor section including a transfer duct extending from a portion of said opening in one side of said first housing to said fan housing, said fan housing having a door covering an opening in the wall of the fan housing aligned with said transfer duct, and means for moving said door from a closed position to an open position to permit air blown by said fan to be exhausted through said transfer duct and said first mentioned duct to said outdoor section.

2. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, said duct having a transverse cross section dimension approximately equal to the length and height of a residential building brick, said first housing having an opening in one side thereof adapted to register with said duct, said first housing including a box therein having one side open and aligned with said opening, said box having one wall through which the free end portions of said first and second refrigerant lines pass, said indoor section including an electrical line having one end supported by said box, said indoor section also including a condensate drain line adapted to provide a passage for the condensate from said evaporator, said condensate line passing through said box and adapted to pass through said duct to said outdoor section, said indoor section including a transfer duct extending from a portion of said opening in one side of said first housing to said fan housing, said fan housing having a door covering an opening in the wall of the fan housing aligned with said transfer duct, and means for moving said door from a closed position to an open position to permit air blown by said fan to be exhausted through said transfer duct and said first mentioned duct to said outdoor section.

3. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, said first housing having an opening on one side thereof adapted to register with said duct, said first housing including a box therein having one side open and aligned with said opening, said box having one wall through which the free end portions of said first and second refrigerant lines pass, said indoor section including an electrical line having one end supported by said box, said indoor section also including a condensate drain line adapted to provide a passage for the condensate from said evaporator, said condensate line passing through said box and adapted to pass through said duct to said outdoor section.

4. An air conditioning unit as set forth in claim **3** wherein said fan has a fan housing therearound, said

indoor section including a transfer duct extending from a portion of said opening in one side of said first housing to said fan housing, said fan housing having a door covering an opening in the wall of the fan housing aligned with said transfer duct, and means for moving said door from a closed position to an open position to permit air blown by said fan to be exhausted through said transfer duct and said first mentioned duct to said outdoor section.

5. An air conditioning unit as set forth in claim 3 wherein said box includes a door movable between an open and a closed position over an opening in one wall of said box, said opening in one wall of said box being adjacent said fan, and means for opening said door to allow said fan to draw fresh outside air through said duct and said opening in said one wall of said box.

6. An air conditioning unit as set forth in claim 5 wherein said fan has a fan housing therearound, said indoor section including a transfer duct extending from a portion of said opening in one side of said first housing to said fan housing, said fan housing having a door covering an opening in the wall of the fan housing aligned with said transfer duct, and means for moving said door from a closed position to an open position to permit air blown by said fan to be exhausted through said transfer duct and said first mentioned duct to said outdoor section.

7. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, a first mounting member having a generally vertically extending back portion adapted to be connected to the inner side of said separating structure, and a generally horizontal shelf portion on which said indoor section rests, a second mounting member having a generally vertically extending back portion adapted to be connected to the outer side of said supporting structure, and a generally horizontal shelf portion on which said outdoor section rests, said back portions of said mounting members having openings therein adapted to horizontally and vertically align with one another, said duct and openings in said mounting members being adapted to be placed in general registration with one another.

8. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, and a generally U-shaped frame adapted for mounting on a window frame in said separating structure.

9. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, a first mounting member having a generally vertically extending back portion adapted to be connected to the inner side of said separating structure, and a generally horizontal shelf on which said indoor section is adapted to rest, said outdoor section being adapted to rest on the ground unsupported by the separating structure.

10. An air conditioning unit adapted for installation through a separating structure comprising an indoor section and an outdoor section, said indoor section including a first housing, and an evaporator and a fan in said housing, said outdoor section including a second housing, a condenser and a compressor in said second housing, said indoor and outdoor sections being completely separable, a detachable duct adapted to extend outwardly from the inside section through said separating structure, first and second refrigerant lines extending from opposite ends of said evaporator through said indoor section toward the end of said duct adjacent to said indoor section, third and fourth refrigerant lines extending from said compressor and said condenser through said outdoor section and said duct toward said indoor section, coupling means on the ends of said refrigerant lines for connecting said first and second lines to said third and fourth lines, the length of said duct being adapted to be varied and two of said refrigerant lines being adapted to be extended from their respective section any of various different lengths to permit installation of said unit through separating structures of various different thicknesses, a sleeve extending through the separating structure and surrounding said unit, said sleeve having a height and length substantially equal to said unit, an insulating member located between said indoor section and said outdoor section, said duct extending through said insulating member and having a length approximately equal to the thickness of said insulating member.

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