

July 24, 1962

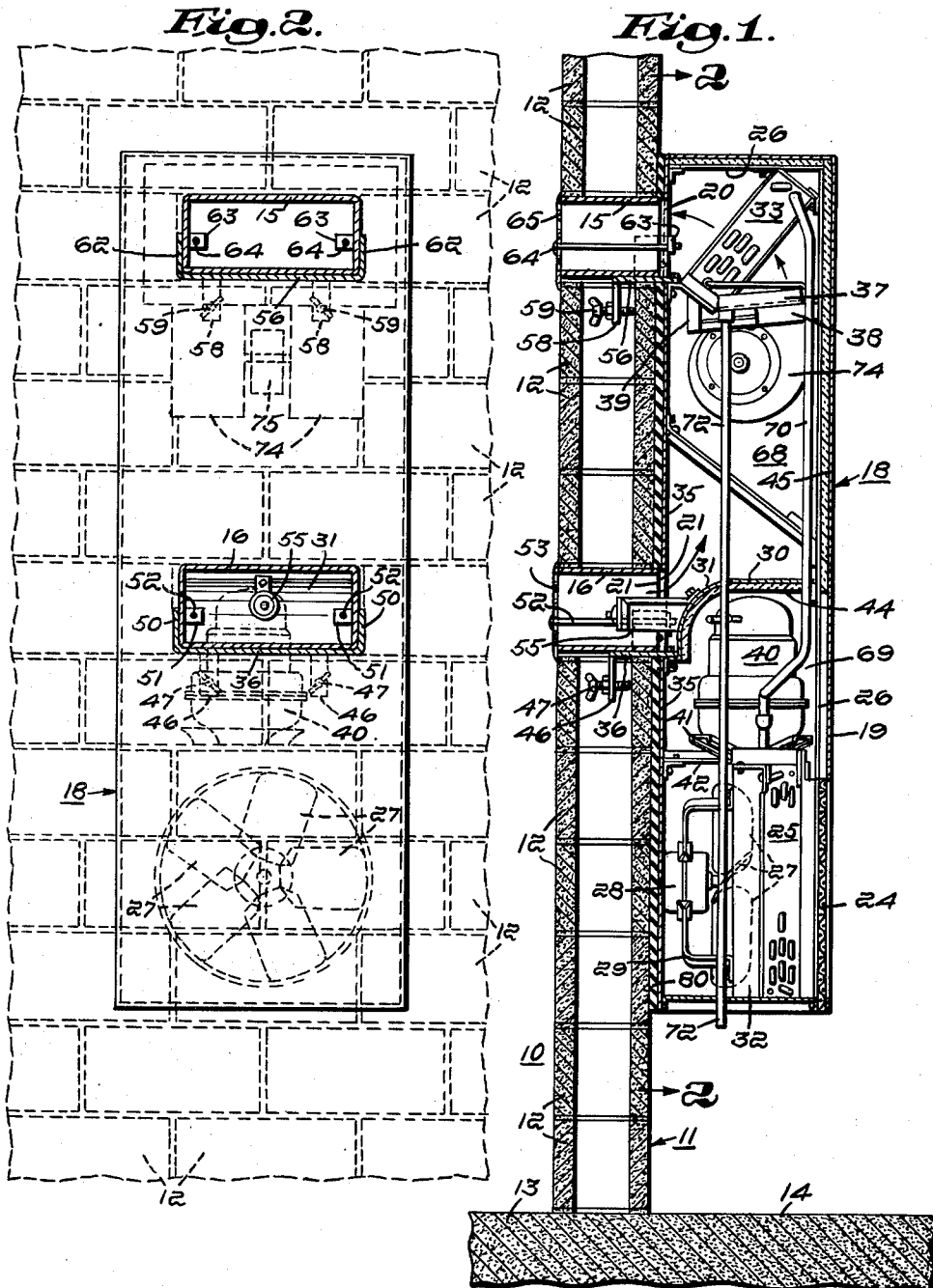
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3,045,448

AIR CONDITIONING UNITS

Filed Nov. 25, 1960

4 Sheets-Sheet 1



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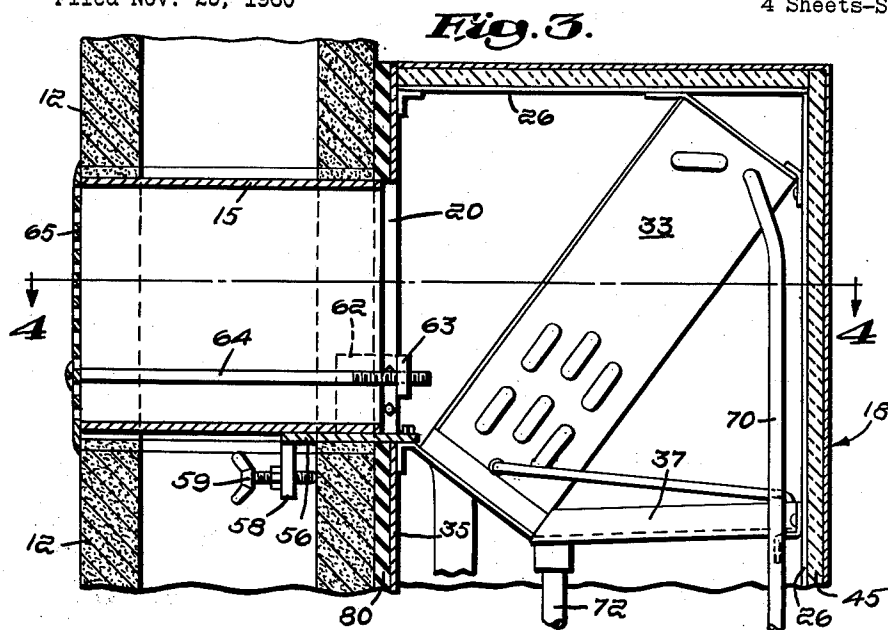
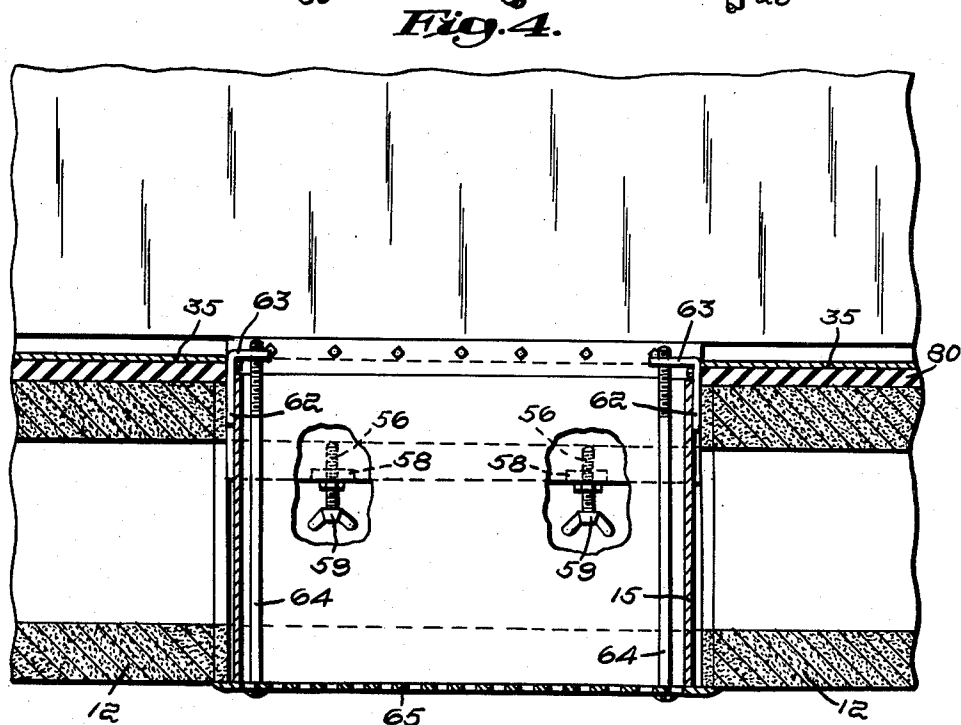
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Filed Nov. 25, 1960

4 Sheets-Sheet 2



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Fig. 5.

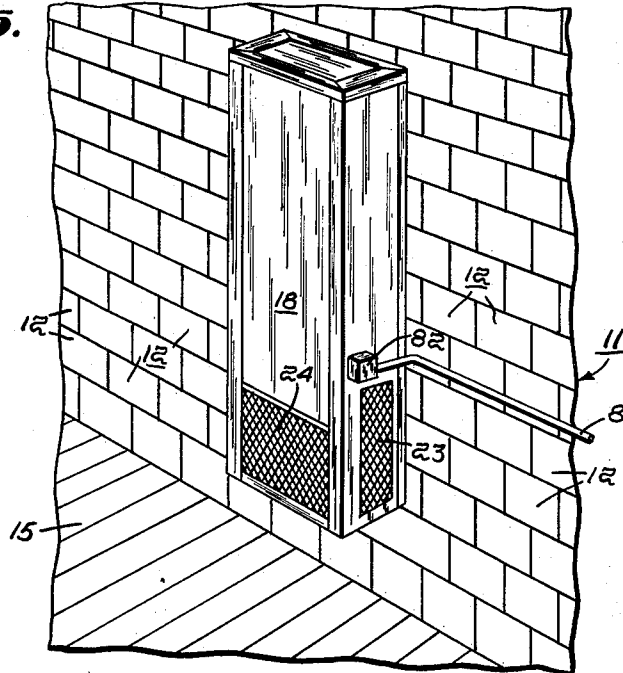
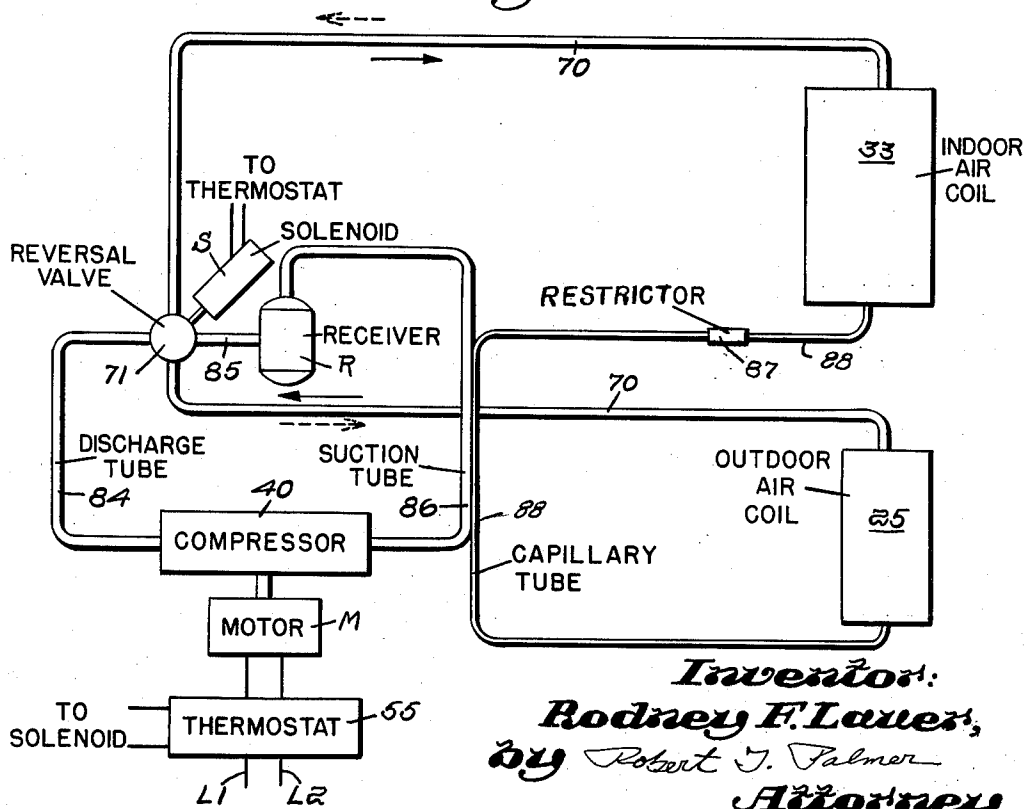


Fig. 6.



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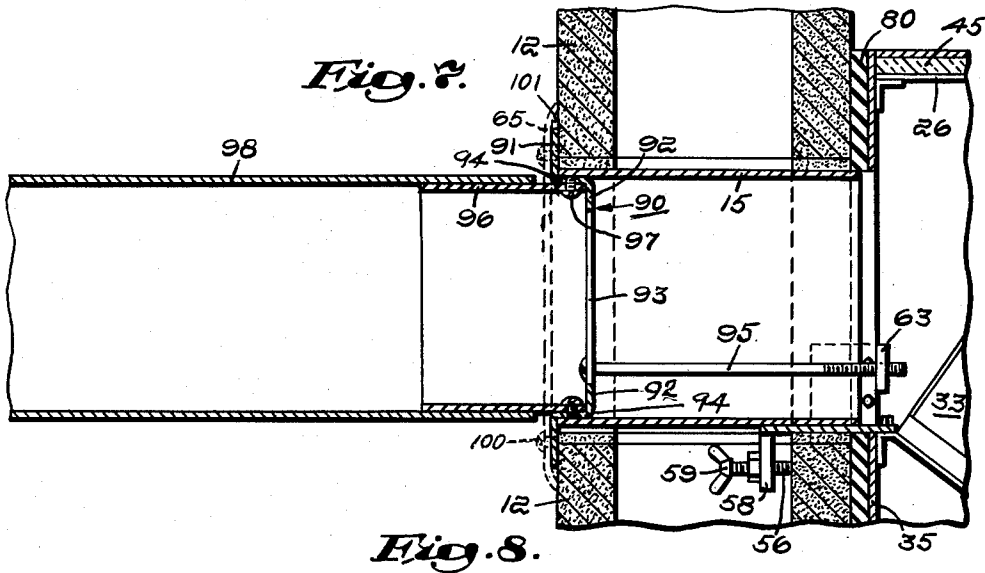
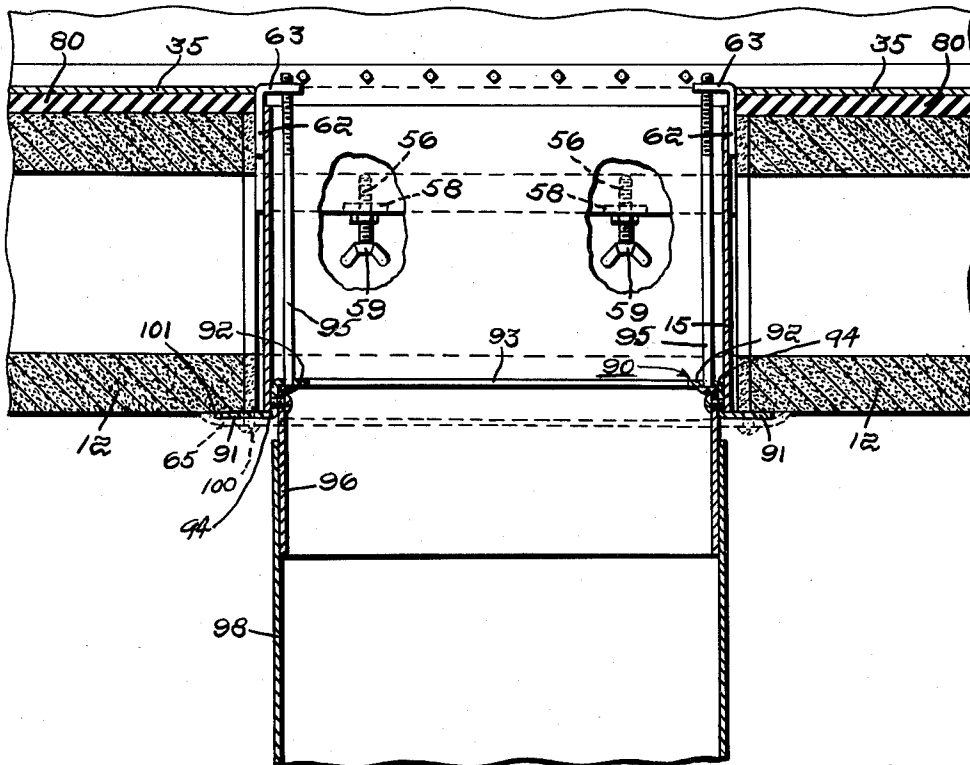
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AIR CONDITIONING UNITS

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4 Sheets-Sheet 4



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3,045,448

AIR CONDITIONING UNITS

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Filed Nov. 25, 1960, Ser. No. 71,809

9 Claims. (Cl. 62-263)

This invention relates to air conditioning units, and relates more particularly to air conditioning units for buildings having no attics or basements in which the usual air conditioning units can be located.

Air conditioning units for cooling the entire interior space of a residence as distinguished from so-called room coolers and window-box units which can effectively cool individual rooms only, have heretofore been installed in the cellars or attics of residences with their outlets connected by ducts to the rooms of the residences. In the southern portions of the United States, many residences have outer walls constructed of hollow concrete building blocks, and have no cellars or attics. This invention enables such a residence to be supplied with conditioned air from a unit supported on the outer side of one of its walls, this wall having a pair of spaced-apart ones of its building blocks omitted or removed, and the air conditioning unit having an air outlet and an air inlet connected by ducts in the openings in the building wall resulting from the missing blocks, with the space within the residence. The unit is self-contained, is serviceable from outside the residence without disturbing the occupants thereof, and is easily installed.

A feature of this invention is that such an air conditioning unit is supported from the building wall by hangers which extend from the unit into the openings left by the missing building blocks.

An object of this invention is to support an air conditioning unit on the outer side of an exterior wall of a building, and to connect the air outlet and the recirculated air inlet of the unit through ducts extending through openings in the building wall, with the interior of the building.

Another object of this invention is to remove or omit two spaced-apart building blocks from a building wall composed of building blocks, and to support an air conditioning unit on the outer side of the wall, with the air outlet and the recirculated air inlet of the unit, connected by ducts in the spaces left by the missing blocks, with the interior of the building.

Another object of this invention is to remove or omit two spaced-apart building blocks from a building wall composed of hollow building blocks, and to support an air conditioning unit on the outer side of the wall by hangers extending into the interiors of the blocks below and adjacent to the spaces left by the missing blocks, with the air outlet and the recirculated air inlet of the unit, connected by ducts in the spaces left by the missing blocks, with the interior of the building.

Another object of this invention is to remove or omit two spaced-apart building blocks from a building wall composed of hollow building blocks, to support an air conditioning unit on the outer side of the wall by hangers extending into the interiors of the blocks below and adjacent to the spaces left by the missing blocks, with the air outlet and the recirculated air inlet of the unit, connected by ducts in the spaces left by the missing blocks, with the interior of the building, and to provide a frame attached to the unit for either holding an air outlet grille across the inner end of the upper duct, or for connecting an extension duct to the inner end of the upper duct.

This invention will now be described with reference to the annexed drawings, of which:

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FIG. 1 is a side view, in section, of a building wall composed of hollow building blocks, with two, spaced-apart, vertically-aligned blocks omitted, and of an air conditioning unit embodying this invention, supported on the outer side of the wall, with its air outlet and recirculated air inlet connected by ducts extending through the spaces left by the missing blocks, with the interior of the building;

FIG. 2 is a section along the line 2-2 of FIG. 1;

FIG. 3 is an enlarged, fragmentary section of the upper portion of the unit of FIGS. 1 and 2;

FIG. 4 is a section along the lines 4-4 of FIG. 3;

FIG. 5 is a perspective view, in reduced scale, of the unit mounted on a wall of a building;

FIG. 6 is a circuit schematic showing the refrigerant and electrical circuits of the unit;

FIG. 7 is an enlarged, fragmentary section of the unit, showing a frame connected to the unit, and extending within the inner end of the upper duct, for connection to an air outlet grille as shown by dashed lines, or to an extension duct as shown by solid lines, and

FIG. 8 is a plan view, in section, looking down on FIG. 7.

A residence having an inner space 10 to be supplied with conditioned air, has an external wall 11 composed of hollow, rectangular blocks 12 of concrete or other suitable material, on a concrete floor 13 having an outer portion 14 forming the floor of a porch.

A seventh block 12 above the floor, and an eleventh block 12 above the floor, vertically aligned with the seventh block, are omitted or removed, leaving rectangular spaces in which are placed air supply and return ducts 15 and 16 respectively. The ducts preferably are collapsible liners. As shown by FIG. 2, since the blocks in adjacent vertical rows are staggered, there are halves of two blocks below the opening left by each missing block.

A heat pump unit 18 has a rectangular casing 19 which extends therearound except for air inlet and outlet openings 20 and 21 respectively, connecting with the ducts 15 and 16 respectively, in the back wall 35 of the unit; except for an outdoor air inlet opening 23 in one of the side walls of the unit, and except for an outdoor air outlet 24 in the front wall of the unit. The outdoor air inlet and outlet openings have grilles thereacross. There may be another outdoor air inlet opening in the opposite side wall of the unit. The casing 19 has an inner wall 26 spaced slightly from its front and top walls.

The unit 18 is supported from the wall 11 by upper and lower hanger plates 56 and 36 respectively. The outer end of the lower plate 36 is attached to the back wall 35. The inner portion of the plate 36 extends through the outer portion of the opening left by the removal of the lower removed building block, and rests on the tops of the two adjacent lower blocks. The bottom of the duct 16 rests on the top of the plate 36. The plate 36 has at its inner end a pair of spaced-apart, clamp flanges 46 which extend downwardly into the interiors of the adjacent lower blocks, and which have wing-bolts 47 threaded there-through against the vertically extending inner surfaces of such lower blocks. The plate 36 has vertically extending side portions 50 in contact with the outer surfaces of the vertical sides of the duct 16. The side portions 50 have flanges 51 which extend transversely into the inlet opening 21, and which receive the threaded outer ends of screws 52 which support a grille 53 across the inner end of the duct 16.

The outer end of the upper clamp plate 56 is attached to the back wall 35. The inner portion of the plate 56 extends through the outer portion of the opening left by the removal of the upper removed building block, and rests on the tops of the adjacent lower blocks. The bottom of the duct 15 rests on the top of the plate 56. The

plate 56 has at its inner end, a pair of spaced-apart, clamp flanges 58 which extend downwardly into the interiors of the adjacent lower blocks, and which have wing-bolts 59 threaded therethrough against the vertically extending inner surfaces of such lower blocks. The plate 56 has vertically extending side portions 62 in contact with the outer surfaces of the vertical sides of the duct 15. The side portions 62 have flanges 63 which extend transversely into the outlet opening 20, and which receive the threaded outer ends of screws 64 which support a grille 65 across the inner end of the duct 15.

A partition wall 30 has a curved inner portion 31 attached at its inner end to the clamp plate 36. The outer end of the wall 30 is attached to the front wall of the casing 19. The wall 30 divides the unit 18 into an upper, air conditioning compartment 68, and into a lower, compressor-outdoor coil compartment 69. The underside of the partition wall 30 has a mat 44 of heat insulating material attached thereto. A similar mat 45 extends between the inner wall 26 and the front wall of the casing above the mat 44, and extends between the wall 26 and the top of the casing.

A control thermostat 55 is supported within the duct 16 from the partition wall portion 31.

An outdoor air coil 25 is supported within the compartment 69 on the lower wall of the casing 19, and supported behind the coil 25 is a propeller fan having blades 27. The fan has an electric motor 28 supported by arms 29 from the casing 32 of the fan.

A hermetically-sealed refrigerant compressor 40 is supported within the compartment 69 on rails 41 and on spaced-apart brackets which are connected to the walls 26 and 35 of the casing 19.

A slanted, indoor air coil 33 within the upper compartment 68 is supported at its lower end to a slanted drain pan 37, and is supported at its upper end to the inner wall 26 of the casing 19. The drain pan is supported at one end to the clamp plate 56 and the wall 35, and at its other end to the wall 26. The coil 33 is connected to the coil 25 by tubing 70. A reversal valve 71 seen on FIG. 6, is connected in the tubing 70. The drain pan 37 has a drain tube 72 extending from its bottom through the lower wall of the casing 19, for removing water condensed from the air when the coil 33 is acting as an evaporator.

A motor and fan mounting bracket 38 is supported at its outer end to the wall 26, and at its inner end by plates 39 to the drain pan 37. A pair of spaced-apart, centrifugal fans 74 with an electric motor 75 for driving the fans 74, are supported by the bracket 38. The inlets of the fans 74 draw air into the unit 18 through the recirculated air inlet opening 21 and blow the air through the indoor air coil 33 into the outlet opening 20. The outlets of the fans 74 connect with air openings in the bottom of the drain pan 37 above its water level. Collected water cannot enter such openings since it is continuously drained through the tube 72.

An air sealing gasket 80 of natural or synthetic rubber or other suitable material, extends the height and width of the unit 18 between its back wall 35 and the adjacent outer surface of the building wall, this gasket having rectangular cut-outs connecting with the outer ends of the ducts 15 and 16.

As shown by FIG. 5, the electrical wiring to the unit is carried through a conduit 81 to a terminal box 82 on one of the side walls of the unit.

In the embodiment of FIGS. 1-5 of the drawings, the conditioned air from the unit 18 is discharged through a grille extending across the inner side of the building wall, into the interior of the building. FIGS. 7 and 8 illustrate another embodiment of the invention in which means is provided for either supporting such a grille from the unit, or for supporting a duct to extend into the building for conveying conditioned air to another space or other spaces in the building.

A plate 90 has an inner, vertical wall portion 91 ex-

tending flat against the inner side of the wall of the building around the opening left by the missing upper building block, and has an outer, vertical wall portion 92 within the inner end portion of the duct 15. The wall portion 92 has a rectangular opening 93 for the passage of conditioned air. The plate 90 has a horizontal wall portion 94 connecting the wall portions 91 and 92. The wall portion 92 has screws 95 extending therethrough and threaded into the flanges 63 of the upper clamp plate 56. A duct collar 98 has the outer surface of its outer end portion in contact with the inner surface of the wall portion 94, and is attached to the wall portion 94 by screws 97. The outer end portion of a duct 98 extends around the inner portion of the collar 96 in snug contact therewith. The duct 98 conveys conditioned air from the unit into another room or other rooms of the building.

If the extension duct 98 is not used, then the collar 96 is omitted, and an air outlet grille 65 shown in dashed lines on FIGS. 7 and 8, is attached by screws 100 to the wall portion 91 over the inner end of the duct 15. A sealing gasket which is not shown, would be placed in the space 101 between the ends of the grille and the inner surface of the building wall.

The refrigerant circuit of the heat pump 18, shown by FIG. 6, is, except that refrigerant distributors are not used, essentially that of the G. L. Biehn Patent No. 2,785,540 which issued March 19, 1957. It has a reversal valve 71 of the type disclosed in the Ditzler-Biehn Patent No. 2,672,734 which issued March 23, 1954. The thermostat 55 connects motor M of the compressor 40, and solenoid S which adjusts the valve 71, to electric supply lines L1 and L2. The valve 71 is connected in the tubing 70 which connects the indoor air coil 33 with the outdoor air coil 25. The valve 71 is also connected through discharge gas tube 84 to the discharge side of the compressor 40, and is connected by tube 85 to liquid receiver R which is connected by tube 86 to the suction side of the compressor. The coil 33 is connected through restrictor 87 and capillary tube 88 to the outdoor air coil 25.

The solid-line arrows of FIG. 6 show the direction of flow of the refrigerant during the heating cycle, and the dashed-line arrows of FIG. 6 show the direction of flow of the refrigerant during the cooling cycle. The restrictor 87 reduces the flow of refrigerant during the cooling cycle as disclosed in said Biehn patent. The capillary tube 88 provides two-way expansion of the refrigerant.

When the thermostat 55 calls for cooling, it operates the solenoid S to adjust the valve 71 to pass refrigerant in the direction shown by the dashed-line arrows, and starts the compressor motor M if the latter is not operating. At this time, the indoor air coil 33 is an evaporator, and the outdoor air coil 25 is a condenser.

When the thermostat calls for heating, it operates the solenoid S to adjust the valve 71 to pass refrigerant in the direction shown by the solid-line arrows, and starts the compressor motor if the latter is not operating. At this time, the indoor air coil 33 is a condenser, and the outdoor air coil 25 is an evaporator.

During both cycles, the thermostat 55 starts and stops the motor M as is necessary to provide the desired indoor temperature.

An outdoor air inlet opening through the casing 19 into the compartment 68 could be provided for fresh, make-up air if such is desired.

In the annexed claims, the ducts referred to as extending through the openings in the building wall, could be any form of surface for lining such openings.

What is claimed is:

1. In combination with a building having an interior space and having an outer wall bounding one side of said space, said wall consisting of superimposed, hollow building blocks, two, spaced-apart, vertically-aligned ones of said blocks being omitted to leave upper and lower openings in said building wall, an air conditioning unit

having a back wall at the outer surface of said building wall, said back wall having an air outlet opening aligned with said upper opening and having a recirculated air inlet opening aligned with said lower opening, means extending horizontally from said unit into said upper and lower openings and downwardly from said last mentioned means into the interiors of the adjacent ones of said blocks below said openings for supporting said unit from said last mentioned blocks, upper and lower ducts within said upper and lower openings respectively, above said horizontal extending means, connecting said space with said outlet and inlet openings respectively, and means within said unit for conditioning air and for supplying the conditioned air through said outlet opening and said upper duct into said space and for drawing air from said space through said lower duct and said inlet opening into said unit.

2. In combination with a building having an interior space, and having an outer wall bounding one side of said space, said wall consisting of superimposed, hollow, building blocks, two, spaced-apart, vertically-aligned ones of said blocks being omitted to leave upper and lower openings in said wall, an air conditioning unit having a back wall at the exterior surface of said building wall, said back wall having an air outlet opening aligned with said upper opening and having a recirculated air inlet opening aligned with said lower opening, means extending from said unit into said upper and lower openings and into the interiors of the adjacent blocks below said upper and lower openings for supporting said unit from said building wall, upper and lower ducts within said upper and lower openings respectively, above said supporting means, and means within said unit for conditioning air and supplying the conditioned air through said outlet opening and said upper duct into said space and for drawing air from said space through said lower duct and said inlet opening into said unit.

3. In combination with a building having an interior space, and having an outer wall bounding one side of said space, said wall consisting of superimposed, hollow, building blocks, two spaced-apart, vertically-aligned ones of said blocks being omitted to leave upper and lower openings in said wall, an air conditioning unit having a back wall at the exterior surface of said building wall, said back wall having an air outlet opening aligned with said upper opening and having a recirculated air inlet opening aligned with said lower opening, clamping plates extending horizontally from said unit into said upper and lower openings and resting on the tops of the adjacent blocks below said upper and lower openings, said plates having clamping flanges extending downwardly into the spaces within said adjacent blocks, bolts threaded through said flanges and contacting sides of the interiors of said adjacent blocks, rectangular ducts within said upper and lower openings and having flat lower sides on said plates, and means within said unit for conditioning air and supplying the conditioned air into said space through said outlet and said upper duct and for drawing air from said space through said lower duct and said inlet opening into said unit.

4. In combination with a building having an interior space, and having an outer wall bounding one side of said space, said wall consisting of superimposed, hollow, building blocks, two spaced-apart, vertically aligned ones of said blocks being omitted to leave upper and lower openings in said wall, an air conditioning unit having a back wall at the exterior surface of said building wall, said back wall having an air outlet opening aligned with said upper opening and having a recirculated air inlet opening aligned with said lower opening, clamping plates extending horizontally from said unit into said upper and lower openings, said plates having clamping flanges extending downwardly into the spaces within the adjacent blocks below said upper and lower openings, said plates resting on the tops of said adjacent blocks, bolts thread-

ed through said flanges and contacting interior surfaces of said adjacent blocks, rectangular ducts within said upper and lower openings having their lower sides on said plates, grilles extending across said ducts at the interior surface of said building wall, said plates having grille flanges at opposite sides of said outlet opening, means for supporting said grilles from said grille flanges, said ducts resting on said plates, and means within said unit for conditioning air and supplying the conditioned air through said outlet opening and the upper of said ducts and for drawing air through said inlet opening and the lower of said ducts into said unit.

5. In combination with a building having an interior space, and having an outer wall bounding one side of said space, said wall consisting of hollow building blocks, two, spaced-apart ones of said blocks being omitted to leave aligned, spaced-apart, first and second openings in said wall, an air conditioning unit having a back wall at the exterior surface of said building wall, said back wall having an air outlet opening aligned with said first opening and having a recirculated air inlet opening aligned with said second opening, means extending horizontally from said unit into said first and second openings and downwardly into the interiors of the adjacent blocks below said openings for supporting said unit from said adjacent blocks, rectangular first and second ducts in said first and second openings respectively, having flat lower sides on said horizontally extending means, and means within said unit for conditioning air and supplying the conditioned air through said outlet opening and said first duct into said space and for drawing air from said space through said second duct and said inlet opening into said unit.

6. In combination with a building having an interior space and having an outer wall bounding said space on one side, said wall having two, spaced-apart, aligned openings extending therethrough, an air conditioning unit having a back wall at the outer surface of said building wall, said unit having an air outlet aligned with one of said openings and a recirculated air inlet aligned with the other of said openings, ducts extending through said openings and connecting with said inlet and outlet, means in said unit for conditioning air and for supplying the conditioned air through said outlet and the one of said ducts connecting therewith into said space, and for drawing air to be conditioned through the one of said ducts connecting with said inlet, and said inlet, into said unit, and means extending from said unit into said openings below said ducts and into said building wall below said openings for supporting said unit from said building wall.

7. In combination with a building having an interior space and having an outer wall bounding one side of said space, said wall having two, spaced-apart, aligned openings extending therethrough, an air conditioning unit having a back wall at the outer surface of said building wall, said unit having an air outlet aligned with one of said openings and a recirculated air inlet aligned with the other of said openings, ducts extending through said openings and connecting with said outlet and inlet, means in said unit for conditioning air and for supplying the conditioned air through said outlet and the one of said ducts connected to said outlet into said space, and for drawing air to be conditioned through the one of said ducts connected to said inlet, and said inlet, into said unit, grilles extending across the inner ends of said ducts, means extending through said ducts connecting said grilles to said unit, and means extending from said back wall into said openings below said ducts for supporting said unit from said building wall.

8. In combination with a building having an interior space and having an outer wall bounding one side of said space, said wall having two, spaced-apart, vertically aligned openings extending therethrough, an air conditioning unit having a back wall at the outer surface of said building wall, said unit having an air outlet aligned

with the upper one of said openings and having a recirculated air inlet aligned with the lower one of said openings, upper and lower ducts extending through said upper and lower openings respectively, and connecting with said outlet and inlet respectively, means within said unit for conditioning air and for supplying the conditioned air through said outlet and upper duct into said space, and for drawing air to be conditioned through said lower duct and said inlet into said unit, means extending into said lower opening and into said building wall below said lower opening and said lower duct for supporting said unit from said building wall, a grille at the inner surface of said building wall and across the inner end of said lower duct, means extending through said lower duct for supporting said grille from said unit, means extending into said upper opening and into said building wall below said upper opening and said upper duct for supporting said unit from said building wall, a support for an extension duct or for an air outlet grille, said support having an outer, hollow portion extending from said inner surface of said building wall into said upper opening, and having a vertically extending inner portion in contact with said inner surface of said building wall around the inner end of said upper opening, means connecting said support to said unit, means for connecting an extension duct to said outer portion of said support when an air outlet grille is not used at the inner end of said upper duct, and means for connecting an air outlet grille to said inner portion of said support when an extension duct is not used.

9. In combination with a building having an inner

space and having an outer wall bounding one side of said space, said wall having two, spaced-apart openings extending therethrough, an air conditioning unit having a back wall at the outer side of said building wall, said unit having an air outlet aligned with one of said openings and having a recirculated air inlet aligned with the other one of said openings, ducts extending from said outlet and inlet through said openings, means for conditioning air and for blowing the conditioned air through said outlet into one of said ducts and for drawing air from said space through the other one of said ducts and said inlet into said unit, means extending from said back wall into said openings and into said outer wall below said ducts for supporting said unit from said outer wall, and a support for an extension duct or an air outlet grille connected through said one duct to said unit, said support having an inner portion in said space and having an outer portion in said one duct, said outer portion having an air opening aligned with said outlet, said support having means for connecting said inner portion to an extension duct, and having means for connecting said inner portion to an air outlet grille extending across the inner end of said upper opening when an extension duct is not used.

References Cited in the file of this patent

UNITED STATES PATENTS

2,362,729	Smith	Nov. 14, 1944
2,712,737	Palmer	July 12, 1955
2,743,908	Tanner	May 1, 1956