

[54] ELECTRICAL CONNECTOR
ARRANGEMENT FOR AIR CONDITIONER
ELECTROSTATIC FILTER

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[22] Filed: Jan. 29, 1973

[21] Appl. No.: 327,696

[52] U.S. Cl. 55/139, 55/2, 339/31 M

[51] Int. Cl. B03c 3/02

[58] Field of Search 55/139, 134, 135, 124,
55/126; 339/31 R, 31 M, 32 R, 32 M, 33,
156, 157, 278 R, 278 M, 75 R, 75 M; 200/1
R, 51.02, 51.03, 51.05, 51.06, 52; 325/43.5 R

[56]

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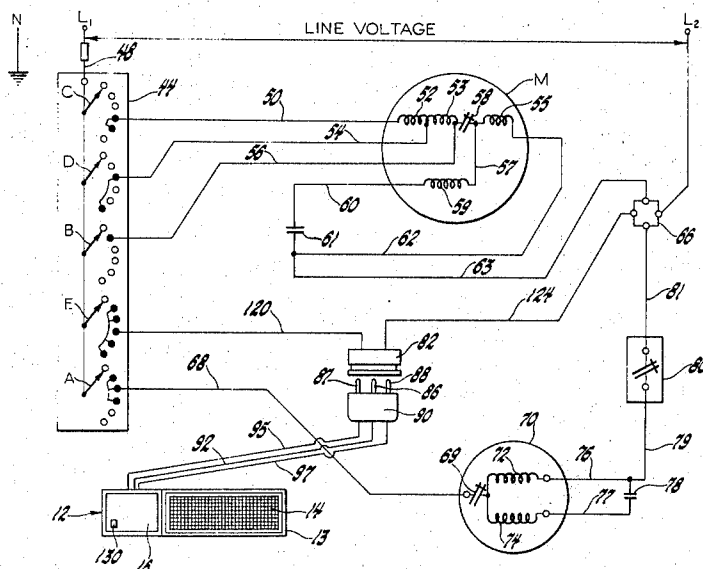
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[57]

ABSTRACT

An electrostatic add-on air cleaner package and room air conditioner electrical connector arrangement is disclosed wherein an air cleaner package can be installed selectively in the discharge duct of either a 115 volt or a 230 volt room air conditioner by a dual purpose three-pin power plug wired to the end terminals and center tap of the primary winding of a step-up transformer in the air cleaner power pack. The three-pin plug may be connected selectively with either the 115 volt air conditioner provided with a mating socket with a first pair of its three pin receiving recesses having conductive sleeves arranged to supply 115 volts to the common end terminal and center tap of the transformer primary winding or to the 230 volt air conditioner provided with a mating socket with a second pair of its three pin receiving recess having conductive sleeves arranged to supply 230 volts to the end terminals of the transformer primary winding.

3 Claims, 6 Drawing Figures



POSITION	SELECTOR SWITCH					FUNCTION
	A	B	C	D	E	
OFF						OFF
CW 60°	X	X			X	HI. COOL & E.A.C
CW 120°	X			X	X	MED. COOL & E.A.C
CW 180°	X		X		X	LO. COOL & E.A.C
CW 240°			X		X	LO. FAN & E.A.C
CW 300°				X	X	MED. FAN E.A.C

Fig. 5

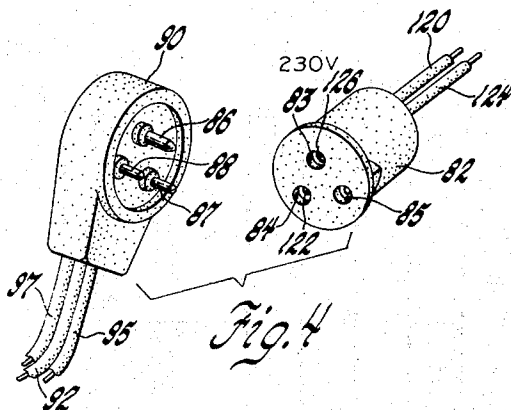


Fig. 4

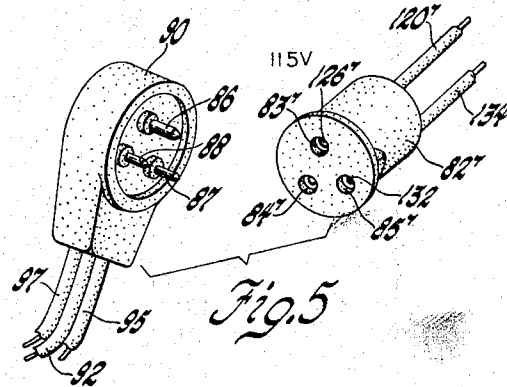


Fig. 5

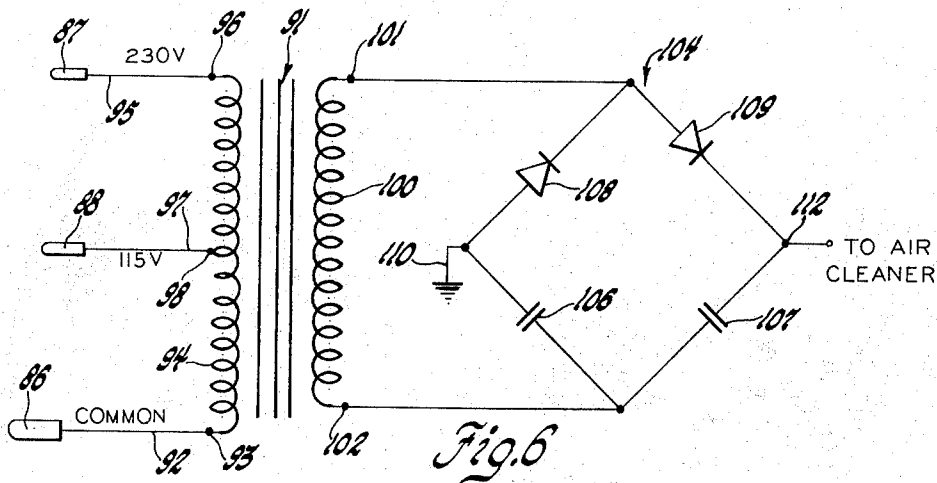


Fig. 6

ELECTRICAL CONNECTOR ARRANGEMENT FOR AIR CONDITIONER ELECTROSTATIC FILTER

The present invention relates to room air conditioners and more particularly to an electrical connector circuit arrangement for an add-on electrostatic air filter.

The manufacturer of room air conditioners is often required by sales demands to provide air cleaning add-on kits for different sizes of units so that purchasers can readily convert a standard air conditioner with electrostatic air cleaning. It is an object of this invention to provide an electrical connector and power pack transformer arrangement for readily connecting the same add-on electrostatic air cleaner kit selectively to either a 115 volt or 230 volt air conditioner unit without any rewiring or adjustments required by the customer during installation.

It is another object of this invention to provide a single add-on electrostatic air cleaner kit for use selectively with either a 115 volt or 230 volt room air conditioner unit in which the air cleaner's three-pin power pack plug is electrically connected to the end terminals and center tap of the primary winding of the power transformer such that the plug of the air cleaner selectively connectable with a socket on the 115 volt unit having one pair of the three pin receiving recesses provided with conductive sleeves connected to each side of a 115 volt power source or to a socket on the 230 volt unit having a second pair of the three pin receiving recesses provided with conductive sleeves connected to each side of a 230 volt power source.

In the drawings:

FIG. 1 is a perspective exploded view of a room air conditioner and an electrostatic air cleaner add-on kit adaptable to be located in the discharge air duct of the air conditioner unit;

FIG. 2 is a schematic wiring diagram of the air conditioner;

FIG. 3 is a control chart for the air conditioner multi-position control switch;

FIG. 4 is a perspective view of the socket for a 230 volt air conditioner unit and its accompanying electrostatic air cleaner plug;

FIG. 5 is a view similar to FIG. 4, showing the socket and plug arrangement for a 115 volt air conditioner unit;

FIG. 6 is a schematic of the dual voltage input transformer in the power section of the electrostatic air cleaner.

Referring now to the drawings, a room air conditioner chassis 10 is shown in FIG. 1 together with an add-on air cleaner kit or package 12 including a frame 13 for holding an electrostatic air cleaner 14 and a power pack unit 16. The air conditioner chassis 10 is provided with a discharge air chamber or duct 18 into which the air cleaner package 12 is inserted. The package 12 is supported on the horizontal partition wall 20 which together with vertical partition wall 22, top wall 24 and side walls 26, 28 form the room air discharge chamber 18. A fan scroll, partially indicated at 30, encloses a centrifugal blower 31 viewed through scroll discharge air outlet opening 32 having a skewed curled-edge cutoff 34 at the throat section of the scroll. Details of a typical room air conditioner scroll housing are shown, for example, in U.S. Pat. No. 3,305,162 issued

to Hall, Jr. and assigned to the assignee of the present application.

Electrical connections for a 230 volt air conditioner unit are shown in FIGS. 1 and 2 and include a three-wire single phase supply conductor 40 providing supply conductors L_1 and L_2 and ground conductor N connecting to three terminals of the plug 42. As seen in the schematic of FIG. 2, the conductor line L_1 is wired into a multiple selector five position manual rotary control snap switch 44 having a single rotary control knob 46. The supply conductor L_1 connects to the movable switch blades A, B, C, D, and E of the switch 44 through line 48.

It will be seen that line 50 connects the fourth fixed contact of the switch blade C with the low speed winding 52 of the fan motor M. The line 54 connects the third fixed contact of the switch blade D with the juncture of the low speed winding 52 and medium speed winding 53 of the fan motor M. The conductor 56 connects the second fixed contact of rotary switch blade B with the juncture of the medium speed winding 53 and main winding 55 while line 57 connects the juncture between the main winding 55 and the motor protector 58 to phase winding 59 and thence via line 60 to fan capacitor 61. Line 62 connects the fan capacitor 61 to the other side of main winding 55 while line 63 connects the fan capacitor 61 with a dummy terminal 66 of the selector switch 48. The line 68 connects the third fixed contact of switch blade A to an overload bimetal thermostat 69, within motor compressor unit 70, which is in turn connected to the juncture of main winding 72 and phase winding 74 of the compressor motor. Conductors 76 and 77 connect the opposite side of the compressor motor main winding 72 and phase winding 74 through a running capacitor 78 via line 79 to a single stage thermostat 80 having control knob 47. The thermostat 80, however, may be of the dual stage type as disclosed for example in U.S. Pat. No. 3,666,002 issued May 30, 1972. The other side of thermostat 80 is connected by line 81 to the dummy terminal 66.

As seen in FIG. 1 a receptacle or socket 82 is located on the wall 22 so as to face outwardly toward the outside air portion of the chassis 10. The socket 82, as shown in FIG. 4, has three recesses or holes 83, 84 and 85 adapted to receive respectively the three pins 86, 87 and 88 of the air cleaner power plug 90. The power plug 90 is wired to transformer 91 of the power pack 16 with its pin 86 connected by common line 92 to end terminal 93 of the primary winding 94 of the transformer 91. The pin 87 is connected by line 95 to supply 230 volts to the other end terminal 96 of the primary winding 94 while the pin 88 is connected by 115 volt line 97 to the center tap 98 of the primary winding 94.

With reference to FIG. 6, the secondary winding 100 of the transformer 91 is connected at its end terminals 101, 102 to bridge rectifier 104 which produces a pulsating direct current to the electrostatic air cleaner 14 in a conventional manner such as described, for example, in U.S. Pat. No. 3,438,180 issued Apr. 15, 1969 to Klouda. In the preferred form applicant's electrostatic unit 14, the details of which are not shown, may comprise two sections, namely a charging or ionizing section and a collecting section. The charging section may consist of fine wires extending between horizontal metal plates; while the collecting section could be a se-

ries of parallel flat plates preferably spaced about one-quarter inch apart.

The DC power supply is obtained by the dual voltage input step-up transformer 91 with a substantially fixed output voltage that is rectified to DC and doubled with the use of two capacitors 106, 107 and two diodes 108, 109 in the bridge rectifier 104 shown grounded at 110. In the present embodiment the output voltage to the air cleaner at terminal 112 is about 5,500 volts DC for the 230 volt applied input at terminals 93 and 96 to the primary winding 94 and an output voltage of about 5,300 volts DC for the 115 volt applied input at center tap terminal 98 and common end terminal 93.

As seen in FIGS. 2, 4 and 6 the socket 82 has line 120 connected between the fourth fixed contact of switch blade E to a connector sleeve 126 positioned in the first recess 83 while the line 124 connects a connector sleeve 122 in second recess 84 to the dummy terminal 66. In the disclosed form upon the first and second pins 86 and 87 of air cleaner plug 90 being pressed into their respective contact sleeves 126 and 122 of socket 82, with the third center tap pin 88 being received in an insulated manner in sleeveless third recess 85, a 230 volt AC charge of about 75 milli amps will be applied to the transformer primary 94. In this way the add-on electrostatic air cleaner kit 12 is readily installed in the room air discharge chamber of a 230 volt air conditioner unit wired at the factory with inexpensive socket 82 by sliding it into the air duct 18 and inserting the power plug 90 and leads 92, 95 and 97 through hole 128 at the rear of the duct 18. It will be noted that the hole 128 is preferably in the form of a knockout to receive a metal tube (not shown) to enclose the leads.

With reference to FIG. 5, the power plug 90 is shown in relation to socket 82' which is adapted to be suitably placed in a bulkhead partition of a 115 volt room air conditioner unit (not shown) in a manner similar to that shown in FIG. 1 for the 230 volt air conditioner. As the 115 volt socket 82' is identical in construction so as to mate with the power plug 90, the socket 82' is shown with the same elements identified with the same numerals, the exception being that each reference numeral for the 115 volt socket 82' is primed. Thus, its first recess 83' has a sleeve connector 126' located therein such that line 120' connects to switch blade E of an identical selector switch (not shown) in the same manner as shown in FIG. 2 for line 120. In the socket 82', however, the third recess 85' has a sleeve connector 132 located therein such that line 134 can connect to the other side of a 115 line voltage supply (not shown) while the second socket recess 84' is sleeveless to receive plug second pin 87 in an insulated fashion. Thus, the identical air cleaner add-on kit 12 can be installed in the discharge air chamber of a 115 volt air conditioner originally equipped with the socket 82' at the factory without requiring any wiring changes by the customer.

The novel arrangement is particularly advantageous because of the relatively low cost of the receptacles 82 and 82' in counterdistinction to the cost of the power plugs 90. It will be noted in FIGS. 4 and 5 that the common first pin 86 of the plug 90 is larger in diameter than pins 87 or 88. In this manner there is only a single alignment possible to permit connection of the plug 90 with either socket 82 or 82' to insure against any incorrect connection of the plug and corresponding sockets.

With reference to the chart of FIG. 3 it will be seen that the electrostatic air cleaner (E.A.C.) is designed to operate when the air conditioner fan motor M is energized, regardless of speed or function, provided the air cleaner ON/OFF switch 130 is in the ON position. Thus the air cleaner can be used all year, even when the air conditioner is not cooling. When the air conditioner fan switch 130 is in its OFF position, the electrostatic air cleaner 12 is automatically in a non-functioning position.

While the embodiment of the present invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted.

I claim:

1. In combination with an air conditioning unit an electrical connector assembly for connecting an air electrostatic air cleaner add-on kit selectively with either a 115 volt air conditioner unit or a 230 volt air conditioner unit, said electrostatic air cleaner including a power pack with a step-up alternating current transformer having a primary winding with a center tap, said transformer having a secondary winding the end terminals of which are connected to said electrostatic air cleaner, a three-pin plug and three conductor cord structure defining means for connecting said cord conductors to said primary winding, said plug having its first pin connected to one end terminal of said primary winding and its second pin connected to the other end terminal of said primary winding, said plug having its third pin connected to said primary winding center tap, a first socket electrically connected in the 115 volt air conditioner, said first socket being provided with three recesses for receiving respectively the three pins of said three-pin plug; said first socket having a first pair of recesses receiving corresponding pins of said plug, said first pair of recesses each provided with a connector sleeve contact into which said corresponding pins are pressed, said first pair of recesses having sleeve contacts connected to either side of a 115 volt power supply, the remaining plug pin being received in the remaining recess of said first socket in an insulated manner whereby 115 volts is applied across one-half of said primary winding, a second socket electrically connected in the 230 volt room air conditioner, said second socket being provided with three recesses for receiving respectively the three pins of said plug; said second socket having a second pair of recesses receiving corresponding pins of said plug, said second pair of recesses each provided with a conductive sleeve contact into which said corresponding pins are pressed, said second pair of recesses having sleeve contacts connected to either side of a 230 volt power supply, said remaining plug pin being received in the remaining recess of said second socket in an insulated manner whereby 230 volts is applied across both halves of said primary winding, whereby a single electrostatic air-cleaner kit may be used selectively with an air conditioner supplied with either 115 volts or 230 volts of electrical power.

2. In combination with a room air conditioning unit an electrical connector assembly for connecting an air electrostatic air cleaner add-on kit selectively in the discharge duct of either a 115 volt room air conditioner unit or a 230 volt room air conditioner unit, said electrostatic air cleaner including a power pack with a step-up alternating current transformer having a primary winding with a center tap, said transformer having a secondary winding the end terminals of which are con-

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ected to said electrostatic air cleaner, a three-pin plug and three conductor cord structure defining means for connecting said cord conductor to said primary winding, said plug having its first pin connected to one end terminal of said primary winding and its second pair 5 connected to the other end terminal of said primary winding, said plug having its third pin connected to said primary winding center tap, a first socket electrically connected in the 115 volt room air conditioner, said first socket being provided with first, second and third recesses for receiving respectively the first, second and third pins of said three-pin plug; said first socket having its first recess receiving said first pin and its third recess receiving said third pin, said first and third recesses of said first socket provided with a connector sleeve 10 contact into which said first and third pins are pressed, said first and third sleeve contacts connected via a selector switch to each side of a 115 volt power supply, said second pin being positioned in the second recess of said first socket in an insulated manner whereby 115 20 volts is applied across one-half of said primary winding, a second socket electrically connected in the 230 volt

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room air conditioner, said second socket being provided with first, second and third recesses for receiving respectively the first, second and third pins of said plug; said second socket having its first and second recesses receiving said first and second pins, said first and second recesses of said second socket provided with conductive sleeve contacts into which said first and second pins are pressed, said first and second recess sleeve contacts connected via a selector switch to either side 10 of a 230 volt power supply, said third pin being positioned in the third recess of said second socket in an insulated manner whereby 230 volts is impressed across both halves of said primary winding, whereby a single electrostatic air-cleaner kit may be used selectively 15 with a room air conditioner supplied with either 115 volts or 230 volts of electrical power such that the power pack supplies a substantially equivalent direct current output to the electrostatic air cleaner.

3. The combination of claim 2 wherein the direct current output supplied to the electrostatic air cleaner is in the range of about 5,300 volts to 5,500 volts.

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