

CLEANING SYSTEM FOR AN AIR CONDITIONER

TECHNICAL FIELD

This invention relates generally to a ceiling air conditioner and cleaning system for ceiling
5 air conditioner.

Background

An air conditioner, or an air conditioning unit or system, is a device that lowers, or increases, the temperature of indoor air by repeating by heat exchange. Indoor air is drawn
10 through coil fins, forming part of a heat exchanger, to condition the temperature of the indoor air (e.g. to cool the indoor air). After a period of use, dirt, oily smoke, and other contaminants adhering to coil fins of ceiling-embedded air conditioners have to be cleaned to improve thermal efficiency. Further, air-conditioner cleaning, which includes the cleaning of the coil fins, is performed to prevent it from becoming a source of pollution,
15 odour and bacterial diseases.

Conventionally, in order to clean an air conditioner installed on a ceiling, chemical cleaning agents are generally used because oil stains and the like are not removed with water alone. In addition, there has been a cleaning method using cleaning agent and high-pressure water
20 are sprayed to remove dirt and wash it off. However, the method using chemical cleaning agents always contains the danger of pollution and environmental pollution, and requires a neutralizing agent and a large amount of rinsing water for the processing of the cleaning agents, resulting in increased costs. There are also drawbacks such as a large amount of drainage. Further, such methods require multiple trained service personnel to set-up,
25 perform and clean-up.

A team of typically three to four personnel are required to clean one unit of ceiling-embedded air-conditioning unit, taking a few hours each time before being able to proceed to another air-conditioning unit for servicing thereof. Further, the crude set-up required for
30 cleaning an air-conditioning unit requires a large amount of space and has a higher chance

of getting an area under the air-conditioning unit wet. Further, the area where the air conditioning unit is being cleaned, for example the meeting room, office or open seating work area, is being disabled for use during the duration of the cleaning. Even with disregard to the aforementioned deficiencies of current cleaning methods and systems, the quality and efficiency of the cleaning exercise cannot be easily determined or quantify. As there is no way to quantify the quality of cleaning performed, stakeholders and cleaning personnel aside are left with gut-feel assessment of how well a cleaning job has been done. Therefore, there exists a need for a system for addressing the foregoing issues.

10 **Summary**

In accordance with a first aspect of the invention, there is disclosed a cleaning system for an air conditioner, the cleaning system comprising a support structure, a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom, at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner, and a manipulator system coupled to the at least one cleaning nozzle and controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger. The support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle and the fluid comprising at least one of water, steam, surfactant, cleaning chemicals and compressed air.

In accordance with a second aspect of the invention, there is disclosed a cleaning method for an air conditioner, the cleaning method comprising removably coupling a support structure to the air conditioner with a coupling means for suspending the support structure from the air conditioner, and discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner at least one cleaning nozzle based on a cleaning sequence. The at least cleaning nozzle being spatially displaceable by a manipulator system to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger. The support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle. The cleaning sequence comprises discharging and directing at least

one of steam and cleaning chemicals to the heat exchanger, discharging and directing water to the heat exchanger, and discharging and directing compressed air towards the heat exchanger.

- 5 In accordance with a third aspect of the invention, there is disclosed a cleaning system for an air conditioner. The cleaning system comprises a support structure, a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom, at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner, a manipulator
- 10 system coupled to the at least one cleaning nozzle and controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger, and at least one temperature sensor for sensing and capturing temperature data from adjacent the heat exchanger, the heat exchanger of the air conditioner comprising coil fins. The cleaning system further comprises a controller for
- 15 controlling the manipulator system and for executing a service sequence for the displacement and positioning of the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator, and a communication module in signal communication with and
- 20 being controllable by the controller for at least one of transmitting data on progress of the service sequence to a central server for communicating instructions from the central server to the controller for at least one of starting, interrupting and overriding the service sequence and for transmitting the captured temperature data to a mobile computing device for generating one of a report and a score therefrom. The at least one cleaning nozzle and the
- 25 fluid comprising at least one of water, steam, surfactant, cleaning chemicals and compressed air. The fluids comprise at least one of water, steam, surfactant, cleaning chemicals and compressed air, the mobile computing device being one of a smart phone, a user interface, a tablet and a displace device

Brief Description of the Drawings

FIG. 1 shows an exemplary partial illustration of a cleaning system according to an aspect of the invention;

- 5 FIG. 2 shows an exemplary partial front sectional view of the cleaning system of FIG. 1 being coupled to an air conditioner;

FIG. 3 shows a partial system diagram of the cleaning system of FIG. 1;

- 10 FIG. 4 shows a fluid flow diagram of the cleaning system of FIG. 1;

FIG. 5 shows an exemplary process flow of a cleaning method according to another aspect of the invention to be applied by the cleaning system of FIG. 1; and

- 15 FIG. 6 shows an exemplary process flow for coupling the cleaning system of FIG. 1 to an air conditioner according to the cleaning method of FIG. 5.

Detailed Description

- 20 An exemplary embodiment of the present invention, a cleaning system 20 for an air conditioner 22 utilizing a cleaning method 100 is described hereinafter with reference to FIG. 1 to FIG. 6.

- 25 The cleaning system 20 comprises a support structure 24, a coupling means 26 for removably coupling the support structure 24 to the air conditioner 22 for suspending the support structure 24 therefrom, and at least one cleaning nozzle 28 being positionable for discharging and directing fluids to exposed portions of a heat exchanger 30 of the air conditioner 22. The cleaning system further comprises a manipulator system 32 coupled to the at least one cleaning nozzle 28 and controllable for spatially displacing the at least
30 cleaning nozzle 28 to thereby vary where the fluid discharged by the at least one cleaning nozzle 28 contacts the heat exchanger 30. Preferably, the support structure 24 is adapted for

substantially collecting the fluid discharged by the at least one cleaning nozzle 28 with the fluids comprising at least one of water, steam, surfactant, cleaning chemicals and compressed air. In an exemplary implementation of the manipulator system 32, the manipulator system 32 may be adapted as a cylindrical turret with the multiple nozzles, forming the at least one nozzle 28, extending from or being formed as orifices in the cylindrical turret. The cylindrical turret is rotationally displaceable and positional and be controlled to rotate or reciprocate to enable fluids discharged from the multiple nozzles to reach various portions of the heat exchanger 30 and to provide 0° cleaning coverage.

Preferably, the support structure 24 comprising a collection tray 34 being shaped and dimensioned for receiving fluids and dirt from the heat exchanger 30. The cleaning system 20 further comprises a collector bin and a flexible tube 38 for fluid communicating the collection tray 34 with the collector bin to enable fluids and dirt collected into the collection tray 34 to be directed to and collected by the collector bin. The cleaning system 20 further comprises at least one pump 40, for example a chemical pump or a water pump, controllable for drawing fluids from at least one fluid reservoir 42 for provision to the at least one cleaning nozzle 28. The at least one fluid reservoir 42 can comprise a water container or a feed from an on-premise water supply, for example a washroom faucet, a cleaning chemical container, a steam generator and a low-noise air compressor. A dedicated one or a group of nozzles, constituting the at least one nozzle 28, may be used for each of the cleaning chemical, steam, water or water jet, and compressed air. Alternatively, a common one or a common group of nozzles, constituting the at least one nozzle 28, may be used for all the cleaning chemical, steam, water or water jet, and compressed air by way of a multi-way valve 43, for example a three-way valve, which is operable to select from which one of the multiple fluid reservoirs 42 the fluid is to be drawn from.

The cleaning system 20 further comprises at least one temperature sensor 44 for sensing and capturing temperature data from adjacent the heat exchanger 30. The heat exchanger 30 of the air conditioner 22 comprising coil fins 46 to increase the surface for heat exchange.

However, dirt trapped on or between the coil fins 46 may cause the heat exchanger 30 to lose its heat exchange efficiency and effectiveness.

The cleaning system 20 further comprises at least one image capture device 48 for capturing
5 images of at least the heat exchanger 30. Preferably, the at least one image capture device 48 is mounted with the at least one cleaning nozzle 28 for enabling displacement and positioning thereof with the at least one cleaning nozzle 28 by the manipulator system 32. Alternatively, the at least one image capture device 48 is independently mounted and independently manipulatable, spatially, from the at least one cleaning nozzle 28.

10 Preferably, the cleaning system further comprises a controller 50 for controlling the manipulator system 32 and for executing a service sequence 52 for the displacement and positioning of the at least one cleaning nozzle 28 and discharge of fluid from the at least one cleaning nozzle 28 for at least one of prepping, cleaning and drying the heat exchanger 30
15 from the fluids discharged therefrom. Preferably, the manipulator system 32 comprising at least one displacement actuator. Further, the controller 50 can be one or a combination of a PIC, PLC or computing unit-based controller. The controller 50 can comprise a user-interface 53 (UI 53) from which the cleaning system 20 may be controlled for initiating, terminating and bypassing or reiterating a portion of the service sequence 52.

20 The cleaning system further comprises a communication module 54 in signal communication with and being controllable by the controller 50 for transmitting data on progress of the service sequence to a central server 56. The communication module 54 is further for communicating instructions from the central server 56 to the controller 50 for at
25 least one of starting, interrupting and overriding the service sequence 52 and may use Bluetooth, Wi-Fi and/or the like wireless communication protocols. The data and images captured by the at least one temperature sensor 44 and the at least one image capture device 48, for example a camera array, before, during and after cleaning of the air conditioner 22 may be stored by the controller 50 and/or be sent to the central server 56. The data and
30 temperature captured before and after servicing can be used to show the effectiveness of

cleaning as well as the current estimated efficiency of the air conditioner 22. These can be used to verify, quantitatively, that the air conditioner 22 has been properly and effectively cleaned by the air conditioner 22. Further, the data and images captured can be used to determine the state of the air conditioner which may be used to determine the mean-time-between-cleaning (MTBC) for a particular air conditioner 22 and for the central server 56 to determine the recommended cleaning schedule or the next cleaning date. A report on the status of the air conditioner 22 before and/or after cleaning by the cleaning system 20 can be generated by the cleaning system 20 and transmitted wirelessly, for example by Bluetooth, Wi-Fi or the like wireless transmission protocol to be either displayed on the UI 53, displaced on one or more mobile devices or be printed. The report may comprise information on one or more of the temperatures of the air conditioner 22 before and after cleaning by the cleaning system 20, a cleaning efficiency score or index based on the collected data and temperature information and/or a table or chart of past efficiency scores for past cleaning sessions of the air conditioner 22 by the cleaning system 20.

Preferably, the communication module 54 is further for transmitting the captured temperature data to a mobile computing device for generating one of a report and a score therefrom. Preferably, the mobile computing device is one of a smart phone, a user interface, a tablet and a display device, for example a smart television, a projector, a display monitor or a laptop screen. This enables the service personnel to present to the customer the completed report, which may be generated by the cleaning system 20 or generated by the mobile phone, or the app operating thereon, from captured temperature data.

Preferably, the at least one cleaning nozzle 28 is at least one cleaning nozzle 28 with adjustable spray profile. Further, the coupling means 26 comprising a receiver structure 58 defining a receptacle 60 for receiving at least a portion of an output shaft 62 of a motor 64 of the air conditioner 22 therein. The receiver structure 58 is operable for at least one of magnetically and mechanically clasp to the output shaft 62 to thereby removably couple the cleaning system 20 with the air conditioner 22. The receiver structure 58 is preferably

cylindrically shaped and may be formed integral with the manipulator system 32, for example the cylindrical turret with which the receiver structure 58 may be formed concentric with.

- 5 The cleaning system 20 further comprises at least one brush 66 coupled to the at least one spray nozzle 28 adjacent thereof for brushing portions of the heat exchanger 30 for dislodging dirt therefrom. Preferably, the at least one brush 66 is one of at least one rotary brush electrically or pneumatically to rotate a roll of bristles for brushing onto the heat exchanger 30.

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Preferably, the manipulator system 32 is mounted to the support structure 24. The manipulator system 32 preferably comprises at least one of a rotary actuator for angular displacement of the at least one cleaning nozzle 28 about a z-axis 70 defined by the support structure 24, and at least one translational stage for displacing the at least one cleaning
15 nozzle 28 substantially along or transverse the z-axis 70. The z-axis is substantially perpendicular the ceiling whereon the air conditioner 22 is mounted or embedded when the support structure 24 is coupled to the air conditioner 22 by the coupling means 26.

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Multiple units of the cleaning system 20 may be used for a premise with multiple air conditioner, or air conditioning unit. Each cleaning system 20 may be transported on-site
via a trolley which may be purpose-built for transporting the cleaning system 20. Once the cleaning system 20 reaches the air conditioner 22 site, an air intake cover of the air conditioner 22 is first removed. Next, the fan or impeller may be removed to expose the output shaft of the motor and to enable access to the coil fins 46 of the heat exchanger 30
25 which substantially circumscribe the output shaft of the motor of the air conditioner 22.

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Next, the cleaning system 20 may be lifted by one or two service persons towards the exposed air conditioner. Alternatively, the trolley may be adapted with a lifting device to lift the cleaning system 20 into position. Next, the cleaning method 100 comprises a step
110 of removably coupling the support structure 24 to the air conditioner 22 with the

coupling means 26 for suspending the support structure 24 from the air conditioner 22. A dedicated application (“app”) running on the smart or mobile device may be used by the service persons to either scan a QR code, or the like machine-readable code, or to sense a RFID tag, for example by NFC, on the air conditioner 22 to identify the air conditioner 22 to be cleaned, or serviced. If no identifier exists, a new QR code or RFID tag may be attached to the air conditioner 22 to register a new air conditioner unit. Alternatively, the at least one image capture device 48 or the communication module 54 may be used to scan the QR code or sense the RFID tag once the cleaning system 20 has been coupled to the air conditioner 20. Electrical power is supplied to the cleaning system 20 via cable attached to an on-premise electrical socket and/or a portable hot-swappable battery pack or an in-built battery supply.

Once the cleaning system 20 has been attached to the air conditioner 20, the service persons may need to initiate operations of the cleaning system 20 or allow remote initiation and control of the cleaning system 20 remotely via the communication module 54 by, for example, the central server 56. The service persons can then move on to install the rest of the other units of the cleaning systems to other air conditioners 22 and does not have to stick around during the duration of the service sequence 52.

The cleaning method 100 further comprises a step 112 of discharging and directing fluids to exposed portions of a heat exchanger 30 of the air conditioner 22 by at least one cleaning nozzle 28 based on a cleaning sequence 52.

Preferably, the cleaning sequence 52 comprises a step 120 of discharging and directing at least one of steam and cleaning chemicals, or surfactants, to the heat exchanger 30 for dislodging any dirt therefrom and specifically from between the coil fins 46, a step 122 of discharging and directing water, or water jets, to the heat exchanger 30 for cleaning away the dirt, and a step 124 of discharging and directing compressed air towards the heat exchanger 30 for drying the heat exchanger 30.

The service sequence 52 is further performed by the controller 50 for controlling the manipulator system 32 to displace and position the at least one cleaning nozzle 28 and discharge of fluid from the at least one cleaning nozzle 28 for at least one of prepping, cleaning and drying the heat exchanger 30 from the fluids discharged therefrom.

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The service sequence 52 further comprises a step 126 of operating and spatially displacing at least one brush 66 coupled to the at least one spray nozzle 28 adjacent thereof for brush brushing portions of the heat exchanger 30 for dislodging dirt therefrom.

- 10 The cleaning method 100 further comprises a step 130 of sensing and capturing temperature data from adjacent the heat exchanger 30 by the at least one temperature sensor 44, the heat exchanger 30 of the air conditioner 22 comprising coil fins 46, and a step 132 of capturing images of at least the heat exchanger 30 by the at least one image capture device 48 mounted with the at least one cleaning nozzle 28 for enabling displacement and positioning
15 thereof with the at least one cleaning nozzle 28 by the manipulator system 32.

- The cleaning method 100 further comprises a step 140 of transmitting data on progress of the service sequence 52 by the communication module 54 in signal communication with the controller 50 to the central server 56, and a step 142 of communicating instructions by the
20 communication module 54 from the central server 56 to the controller 50 for at least one of starting, interrupting and overriding the service sequence 52.

- Preferably, the step 110 of removably coupling a support structure 24 to the air conditioner 22 comprises a step 150 of receiving at least a portion of the output shaft 62 of the motor 64
25 of the air conditioner 22 into the receptacle 60 defined by the receiver structure 58 of the coupling means 26, and a step 152 of at least one of magnetically and mechanically clasp the receiver structure 58 to the output shaft 62 to thereby removably couple the cleaning system 20 with the air conditioner 22.

Once the service sequence 52 is has been completed, the service persons may remotely check look at the coil fins 46 of the heat exchanger 30 via the at least one image capture device 48 and optionally decide if further or extended cleaning is required. The pre and post-cleaning temperature data may also be captured and sent to the service persons so that
5 the data ma be shown or shared with the premise owner, manager or tenant. All the service persons have to do is to return to the location of the air conditioner 22 to uncouple the cleaning system 20 from the air conditioner 22 for loading back on the trolley. This greatly reduces the manpower requirement for servicing or cleaning of air conditioners.

10 Aspects of particular embodiments of the present disclosure address at least one aspect, problem, limitation, and/or disadvantage associated with existing systems for cleaning air conditioners. While features, aspects, and/or advantages associated with certain embodiments have been described in the disclosure, other embodiments may also exhibit such features, aspects, and/or advantages, and not all embodiments need necessarily exhibit
15 such features, aspects, and/or advantages to fall within the scope of the disclosure. It will be appreciated by a person of ordinary skill in the art that several of the above-disclosed structures, components, or alternatives thereof, can be desirably combined into alternative structures, components, and/or applications. In addition, various modifications, alterations, and/or improvements may be made to various embodiments that are disclosed by a person of
20 ordinary skill in the art within the scope of the present disclosure, which is limited only by the following claims.

Claims

1. A cleaning system for an air conditioner, the cleaning system comprising:
 - a support structure;
 - 5 a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom;
 - at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner; and
 - a manipulator system coupled to the at least one cleaning nozzle and
 - 10 controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger,
 - wherein the support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle and the fluid comprising at least one
 - 15 of water, steam, surfactant, cleaning chemicals and compressed air.
2. The cleaning system as in claim 1, the support structure comprising a collection tray being shaped and dimensioned for receiving fluids and dirt from the heat exchanger.
- 20 3. The cleaning system as in claim 2, further comprising:
 - a collector bin; and
 - a flexible tube for fluid communicating the collection tray with the collector bin to enable fluids and dirt collected into the collection tray to be directed to and
 - collected by the collector bin.
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4. The cleaning system as in claim 1, further comprising at least one pump controllable for drawing fluids from at least one fluid reservoir for provision to the at least one cleaning nozzle.

5. The cleaning system as in claim 1, further comprising at least one temperature sensor for sensing and capturing temperature data from adjacent the heat exchanger, the heat exchanger of the air conditioner comprising coil fins.
- 5 6. The cleaning system as in claim 1, further comprising at least one image capture device for capturing images of at least the heat exchanger.
7. The cleaning system as in claim 6, the at least one image capture device being mounted with the at least one cleaning nozzle for enabling displacement and
10 positioning thereof with the at least one cleaning nozzle by the manipulator system.
8. The cleaning system as in claim 1, further comprising:
 - a controller for controlling the manipulator system and for executing a service sequence for the displacement and positioning of the at least one cleaning
15 nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator.
9. The cleaning system as in claim 8, further comprising:
 - 20 a communication module in signal communication with and being controllable by the controller for transmitting data on progress of the service sequence to a central server, the communication module being further for communicating instructions from the central server to the controller for at least one of starting, interrupting and overriding the service sequence.
- 25 10. The cleaning system as in claim 1, the manipulator system being mounted to the support structure and comprising:
 - at least one of a rotary actuator for angular displacement of the at least one cleaning nozzle about a z-axis defined by the support structure; and

a translational stage for displacing the at least one cleaning nozzle substantially along the z-axis,

wherein the z-axis is substantially perpendicular the ceiling when the support structure is coupled to the air conditioner by the coupling means.

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11. The cleaning system as in claim 1, the at least one cleaning nozzle being at least one cleaning nozzle with adjustable spray profile.

12. The cleaning system as in claim 1, further comprising at least one brush coupled to the at least one spray nozzle adjacent thereof for brushing portions of the heat exchanger for dislodging dirt therefrom,

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wherein the at least one brush is one of at least one rotary brush.

13. The cleaning system as in claim 1, the coupling means comprising a receiver structure defining a receptacle for receiving at least a portion of an output shaft of a motor of the air conditioner thereinto, the receiver structure being operable for at least one of magnetically and mechanically clasp to the output shaft to thereby removably couple the cleaning system with the air conditioner.

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14. A cleaning method for an air conditioner, the cleaning method comprising:
removably coupling a support structure to the air conditioner with a coupling means for suspending the support structure from the air conditioner; and

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discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner by at least one cleaning nozzle based on a cleaning sequence, the at least cleaning nozzle being spatially displacable by a manipulator system to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger,

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wherein the support structure is adapted for substantially collecting the fluid discharged by the at least one cleaning nozzle and the cleaning sequence comprises:

discharging and directing at least one of steam and cleaning chemicals to the heat exchanger;

discharging and directing water to the heat exchanger; and

discharging and directing compressed air towards the heat exchanger.

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15. The cleaning method as in claim 14, the support structure comprising a collection tray being shaped and dimensioned for receiving fluids and dirt from the heat exchanger, the received fluids and dirt being directed by a flexible tube to a collector bin for collection thereby.

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16. The cleaning method as in claim 14, further comprising at least one pump controllable for drawing fluids from at least one fluid reservoir for provision to the at least one cleaning nozzle.

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17. The cleaning method as in claim 14, further comprising:

sensing and capturing temperature data from adjacent the heat exchanger by at least one temperature sensor, the heat exchanger of the air conditioner comprising coil fins; and

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capturing images of at least the heat exchanger by at least one image capture device mounted with the at least one cleaning nozzle for enabling displacement and positioning thereof with the at least one cleaning nozzle by the manipulator system.

18. The cleaning method as in claim 14, further comprising:

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executing the service sequence by a controller for controlling the manipulator system displace and position the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator.

19. The cleaning method as in claim 18, further comprising:
transmitting data on progress of the service sequence by a communication module in signal communication with the controller to a central server; and
5 communicating instructions by the communications module from the central server to the controller for at least one of starting, interrupting and overriding the service sequence.
20. The cleaning method as in claim 14, the service sequence further comprising:
10 operating and spatially displacing at least one brush coupled to the at least one spray nozzle adjacent thereof for brushing portions of the heat exchanger for dislodging dirt therefrom,
wherein the at least one brush is one of at least one rotary brush.
- 15 21. The cleaning method as in claim 14, removably coupling a support structure to the air conditioner comprising:
receiving at least a portion of an output shaft of a motor of the air conditioner into a receptacle defined by a receiver structure of the coupling means;
and
20 at least one of magnetically and mechanically clasping the receiver structure to the output shaft to thereby removably couple the cleaning system with the air conditioner.

22. A cleaning system for an air conditioner, the cleaning system comprising:

a support structure;

5 a coupling means for removably coupling the support structure to the air conditioner for suspending the support structure therefrom;

at least one cleaning nozzle being positionable for discharging and directing fluids to exposed portions of a heat exchanger of the air conditioner;

10 a manipulator system coupled to the at least one cleaning nozzle and controllable for spatially displacing the at least cleaning nozzle to thereby vary where the fluid discharged by the at least one cleaning nozzle contacts the heat exchanger;

at least one temperature sensor for sensing and capturing temperature data from adjacent the heat exchanger, the heat exchanger of the air conditioner comprising coil fins;

15 a controller for controlling the manipulator system and for executing a service sequence for the displacement and positioning of the at least one cleaning nozzle and discharge of fluid from the at least one cleaning nozzle for at least one of prepping, cleaning and drying the heat exchanger from the fluids discharged therefrom, the manipulator system comprising at least one displacement actuator; and

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a communication module in signal communication with and being controllable by the controller for at least one of transmitting data on progress of the service sequence to a central server for communicating instructions from the central server to the controller for at least one of starting, interrupting and overriding the service sequence and for transmitting the captured temperature data to a mobile computing device for generating one of a report and a score therefrom.

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wherein the fluids comprise at least one of water, steam, surfactant, cleaning chemicals and compressed air, the mobile computing device being one of a smart phone, a user interface, a tablet and a displace device.

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