EXPANDABLE ENVIRONMENTAL CONTROL UNIT

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates generally to an environmental control unit, and specifically to a portable environmental control unit. More specifically, the present disclosure relates to a portable environmental control unit for cooling and/or heating an enclosed space, such as a building structure or temporary shelter.

BACKGROUND

[0002] Temporary shelters, such as field hospitals and living quarters, often require cooling and/or heating to maintain a comfortable space to work, eat, and sleep. Portable environmental control units can be shipped with the temporary shelters or otherwise transported to a location in the field to provide cooling and/or heating to these structures. Size and weight restrictions can be imposed on environmental control units to minimize the cost and burden of transporting the units to the field. However, these restrictions limit the capacity and/or efficiency of the environmental control units. It would be desirable to have a portable environmental control unit with improved capacity and/or efficiency with minimal footprint for transport.

[0003] This background information is merely for context and no admission is intended, nor should such admission be inferred or construed, that any of the preceding information constitutes prior art against the present disclosure.

SUMMARY OF INVENTION

[00003a] According to a first aspect of the present invention, there is provided an environmental control unit comprising:

a base section;

a mobile section coupled to the base section for movement between a collapsed-storage position arranged substantially within the base section and an expanded-use position extending from the base section, wherein the mobile section includes a carriage coupled to the base section for movement between a stowed position corresponding to the collapsed-storage position and a deployed position corresponding to the expanded-use position, an air return coupled to the carriage for movement with the carriage relative to the base section, and an air supply coupled to the carriage opposite of the air return for movement with the carriage relative to the base section; and

a temperature control system coupled to the base section and the mobile section, the temperature control system configured to selectively heat or cool air flowing through the mobile section,

wherein an indoor heat exchanger of the temperature control system is coupled to the carriage of the mobile section and an outdoor heat exchanger of the temperature control system is coupled to the base section, wherein the indoor heat exchanger is arranged for movement with the mobile section relative to the outdoor heat exchanger between the collapsed-storage and expanded-use positions, wherein the indoor heat exchanger is contained within the base section in the collapsed-storage position, wherein the air return is movable between a retracted position and an extended position relative to the carriage, and wherein the air supply is movable between a flattened position and an erected position relative to the carriage.

[00003b] According to a second aspect of the present invention, there is provided an environmental control unit comprising:

a base section;

a mobile section coupled to the base section for movement between a collapsed-storage position arranged substantially within the base section and an expanded-use position extending from the base section, the mobile section including a carriage coupled to the base section for movement between a stowed position corresponding to the collapsed-storage position and a deployed position corresponding to the expanded-use position, an air return coupled to the carriage for movement with the carriage relative to the base section, and an air supply coupled to the carriage opposite of the air return for movement with the carriage relative to the base section; and

a temperature control system coupled to the base section and the mobile section, the temperature control system configured to selectively heat or cool air flowing through the mobile section,

wherein movement of the carriage from the stowed position to the deployed position defines a first plenum within the base section to allow air flow through an outdoor heat exchanger coupled to the base section, and

wherein movement of the air return from a retracted position to an extended position relative to the carriage defines a second plenum and movement of the air supply from a flattened position to an erected position relative to the carriage defines a third plenum to allow air flow through an indoor heat exchanger coupled to the mobile section.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Fig. 1 is a front perspective view of an expandable environmental control unit (ECU) showing that the ECU includes a base section, a mobile section coupled to the

What is claimed is:

1. An environmental control unit comprising:

a base section;

a mobile section coupled to the base section for movement between a collapsed-storage position arranged substantially within the base section and an expanded-use position extending from the base section, wherein the mobile section includes a carriage coupled to the base section for movement between a stowed position corresponding to the collapsed-storage position and a deployed position corresponding to the expanded-use position, an air return coupled to the carriage for movement with the carriage relative to the base section, and an air supply coupled to the carriage opposite of the air return for movement with the carriage relative to the base section; and

a temperature control system coupled to the base section and the mobile section, the temperature control system configured to selectively heat or cool air flowing through the mobile section,

wherein an indoor heat exchanger of the temperature control system is coupled to the carriage of the mobile section and an outdoor heat exchanger of the temperature control system is coupled to the base section, wherein the indoor heat exchanger is arranged for movement with the mobile section relative to the outdoor heat exchanger between the collapsed-storage and expanded-use positions, wherein the indoor heat exchanger is contained within the base section in the collapsed-storage position, wherein the air return is movable between a retracted position and an extended position relative to the carriage,

and wherein the air supply is movable between a flattened position and an erected position relative to the carriage.

2. The environmental control unit of claim 1, wherein the carriage includes a frame and a slide mechanism coupled to the frame and to the base section to guide movement of the carriage between the stowed and deployed positions.

3. The environmental control unit of claim 2, wherein the temperature control system further comprises an expansion device and a compressor coupled with the indoor and outdoor heat exchangers to define a circuit for a working fluid, wherein the expansion device and indoor heat exchanger are coupled to the frame, and wherein the compressor and outdoor heat exchanger are coupled to the base section.

4. The environmental control unit of claim 1, wherein the air return includes a blower unit coupled to an extendable strut and a flexible shroud coupled to the blower unit and to the carriage, wherein the extendable strut is coupled to the carriage and configured to guide movement of the blower unit relative to the carriage for movement of the air return between the retracted and extended positions, and wherein the blower unit is configured to drive air flow through the indoor heat exchanger to promote heat transfer between the indoor heat exchanger and the air.

5. The environmental control unit of claim 4, wherein the extendable strut includes a bracket and a slide mechanism coupled to the bracket, wherein the blower unit is coupled to the slide mechanism of the extendable strut, and wherein the bracket is coupled to the carriage.

6. The environmental control unit of claim 5, further comprising a latch coupled to the extendable strut, wherein the latch is movable between a stay position and a release position relative to the extendable strut, wherein in the stay position the latch is configured to engage with the slide mechanism to block movement of the air return between the extended and retracted positions, and wherein in the release position the latch is configured to allow movement of the air return between the extended and retracted positions.

7. The environmental control unit of claim 1, wherein the air supply includes a flexible shroud coupled to the carriage, a hanger coupled to the shroud, and a flap pivotally coupled to the carriage, and wherein the shroud, hanger, and flap extend along the carriage in the flattened position and extend away from the carriage in the erected position.

8. The environmental control unit of claim 7, wherein the hanger is mounted on the flap in the erected position.

9. The environmental control unit of claim 1, further comprising a fan assembly coupled to the base section, wherein the fan assembly is configured to pull air through the outdoor heat exchanger to promote heat transfer between the air and the outdoor heat exchanger.

10. The environmental control unit of claim 9, wherein the fan assembly includes a fan unit, clamp members, and rods, wherein the clamp members extend around the fan unit, wherein the rods are coupled to the fan unit and extend through the clamp members to allow sliding movement of the fan unit relative to the base section between an

inboard position arranged substantially within the base section and an outboard position extending away from the base section.

11. An environmental control unit comprising:

a base section;

a mobile section coupled to the base section for movement between a collapsed-storage position arranged substantially within the base section and an expanded-use position extending from the base section, the mobile section including a carriage coupled to the base section for movement between a stowed position corresponding to the collapsed-storage position and a deployed position corresponding to the expanded-use position, an air return coupled to the carriage for movement with the carriage relative to the base section, and an air supply coupled to the carriage opposite of the air return for movement with the carriage relative to the base section; and

a temperature control system coupled to the base section and the mobile section, the temperature control system configured to selectively heat or cool air flowing through the mobile section,

wherein movement of the carriage from the stowed position to the deployed position defines a first plenum within the base section to allow air flow through an outdoor heat exchanger coupled to the base section, and

wherein movement of the air return from a retracted position to an extended position relative to the carriage defines a second plenum and movement of the air supply from a flattened position to an erected position relative to the carriage defines a third plenum to allow air flow through an indoor heat exchanger coupled to the mobile section.

12. The environmental control unit of claim 11, wherein the carriage includes a frame and a slide mechanism coupled to the frame and to the base section to guide movement of the carriage between the stowed and deployed positions.

13. The environmental control unit of claim 11, wherein the air return includes a blower unit coupled to an extendable strut and a flexible shroud coupled to the blower unit and to the carriage, wherein the extendable strut is coupled to the carriage and configured to guide movement of the blower unit relative to the carriage for movement of the air return between the retracted and extended positions, and wherein the blower unit is configured to drive air flow through the second and third plenums.

14. The environmental control unit of claim 13, wherein the extendable strut includes a bracket and a slide mechanism coupled to the bracket, wherein the blower unit is coupled to the slide mechanism of the extendable strut, and wherein the bracket is coupled to the carriage.

15. The environmental control unit of claim 11, wherein the air supply includes a flexible shroud coupled to the carriage, a hanger coupled to the shroud, and a flap pivotally coupled to the carriage, and wherein the shroud, hanger, and flap extend along the carriage in the flattened position and extend away from the carriage in the erected position, and wherein the hanger is mounted on the flap in the erected position.

16. The environmental control unit of claim 11, further comprising a fan assembly coupled to the base section, wherein the fan assembly is configured to pull air through the first plenum.

17. The environmental control unit of claim 16, wherein the fan assembly includes a fan unit, clamp members, and rods, wherein the clamp members extend around the fan unit, wherein the rods are coupled to the fan unit and extend through the clamp members to allow sliding movement of the fan unit relative to the base section between an inboard position arranged substantially within the base section and an outboard position extending away from the base section.