CLAIMS

1. A single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner, comprising:

a single-stage carbon dioxide circulation system using a single carbon dioxide as a circulating working medium, wherein the single-stage carbon dioxide circulation system comprises an outdoor unit and a plurality of end heat exchangers arranged in parallel, and cooling and/or heating is performed by carbon dioxide medium circulating in a carbon dioxide compressor, an outdoor heat exchanger, a liquid storage tank, and the plurality of end heat exchangers that are communicated with each other,

wherein the central air conditioner further comprises a pressure regulating device comprising a pressure regulating tank, the pressure regulating tank is communicated with the liquid storage tank through a pipeline, and the pressure regulating tank is connected with a pipeline at the suction end of the carbon dioxide compressor;

wherein a third electronic expansion valve is arranged between the pressure regulating tank and the pipeline at the suction end of the carbon dioxide compressor, and a bottom of the pressure regulating tank is communicated with a top of the liquid storage tank, and a top of the pressure regulating tank is connected to the pipeline at the suction end of the carbon dioxide compressor; and

wherein the central air conditioner comprises a floor heating device, the floor heating device comprises a floor heating pipe and a sixth solenoid valve, the sixth solenoid valve is connected in series to a pipeline of the floor heating pipe, and the floor heating device is connected in parallel with the plurality of end heat exchangers.

2. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein the carbon dioxide compressor, the outdoor heat exchanger and the liquid storage tank constitute the outdoor unit for providing refrigerant or heat medium, each of the plurality of end heat exchangers is arranged indoors for adjusting a temperature in a space, one outdoor unit is configured to tow 30 or more indoor units, and the carbon dioxide medium is allowed to circulate in a

high-rise building at a height of 100 meters or more.

3. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein the central air conditioner comprises a first high-pressure four-way valve and a second high-pressure four-way valve, four ports of the first high-pressure four-way valve are respectively connected to a suction end of the carbon dioxide compressor, an exhaust end of the carbon dioxide compressor, the outdoor heat exchanger, and the plurality of end heat exchangers; and four ports of the second high-pressure four-way valve are respectively connected to the outdoor heat exchanger, a liquid inlet of the liquid storage tank, a liquid outlet of the liquid storage tank, and the plurality of end heat exchangers.

4. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 3, wherein a first one-way overflow valve is arranged at a pipeline between the liquid storage tank and the second high-pressure four-way valve.

5. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein a first electronic expansion valve is arranged at a pipeline between the outdoor heat exchanger and the liquid storage tank, and a second electronic expansion valve group is connected in series to pipelines at the plurality of end heat exchangers.

6. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 3, wherein

in a cooling mode, the exhaust end of the carbon dioxide compressor and an suction end of the outdoor heat exchanger are communicated and an outlet end of each of the plurality of end heat exchangers and the suction end of the carbon dioxide compressor are communicated through the first high-pressure four-way valve, an outlet end of the outdoor

heat exchanger and the liquid inlet of the liquid storage tank are communicated and the liquid outlet of the liquid storage tank and an inlet end of each of the plurality of end heat exchangers are communicated through the second high-pressure four-way valve, and the carbon dioxide medium successively flows through the carbon dioxide compressor, the first high-pressure four-way valve, the outdoor heat exchanger, the first electronic expansion valve, the second high-pressure four-way valve, the first one-way overflow valve, the liquid storage tank, the second electronic expansion valve group, and the plurality of end heat exchangers to perform cooling, and when cooling is performed, an evaporation temperature is controlled between 6 degrees Celsius and 10 degrees Celsius to obtain a good physical effect;

in a heating mode, the exhaust end of the carbon dioxide compressor and the plurality of end heat exchangers are communicated and the outdoor heat exchanger and the suction end of the carbon dioxide compressor are communicated through the first high-pressure four-way valve, the outdoor heat exchanger and the liquid storage tank are communicated and the liquid storage tank and the plurality of end heat exchangers are communicated through the second high-pressure four-way valve, and the carbon dioxide medium successively flows through the carbon dioxide compressor, the first high-pressure four-way valve, the plurality of end heat exchangers, the liquid storage tank, the second high-pressure four-way valve, the first electronic expansion valve, and the outdoor heat exchanger to perform heating.

7. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein the central air conditioner further comprises a hot water supply device connected to a pipeline at the exhaust end of the carbon dioxide compressor.

8. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 7, wherein the hot water supply device comprises a water storage tank, a hot water pipe, a second one-way overflow valve, and a first solenoid valve, the hot water pipe is arranged in the water storage tank, two ends

of the hot water pipe are connected with the pipeline at the exhaust end of the carbon dioxide compressor, the second one-way overflow valve is arranged at a pipeline at an outlet end of the hot water pipe, the first solenoid valve is arranged at the pipeline at the exhaust end of the carbon dioxide compressor, between positions at which the hot water pipe is connected to the pipeline at the exhaust end of the carbon dioxide compressor, the first solenoid valve is used to control whether to generate hot water, the water storage tank comprises a cold water inlet and a hot water outlet, wherein cold water under a certain pressure enters the water storage tank through the cold water inlet, and water in the water storage tank exchanges heat through the hot water pipe to generate hot water.

9. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein the central air conditioner comprises an ice storage device connected in parallel with the plurality of end heat exchangers, and the ice storage device comprises one or more of ice storage refrigerators, ice storage freezers or ice storage cold storages connected in parallel.

10. The single-stage carbon dioxide multi-split heating and cooling multifunctional central air conditioner according to claim 9, wherein a fourth electronic expansion valve group is connected in series to a pipeline at the ice storage device, a second solenoid valve is arranged at an inlet pipeline of the ice storage device, a third solenoid valve is arranged at an outlet pipeline of the ice storage device, an outlet end of the ice storage device is connected to the suction end of the carbon dioxide compressor, and a fourth solenoid valve is arranged at a pipeline for connecting the outlet end of the ice storage device to the suction end of the carbon dioxide compressor.

11. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein a carbon dioxide fire extinguishing device is connected at a circulation pipeline of the central air conditioner, and the carbon dioxide fire extinguishing device comprises a fire-fighting pipeline and a fifth solenoid valve connected in series to the fire-fighting pipeline, wherein the fire-fighting pipeline

is connected to a carbon dioxide circulation pipeline.

12. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 1, wherein the outdoor heat exchanger comprises an aerosol generating device and a heat exchange pipe, aerosol in the aerosol generating device enters a heat exchanger chamber, water microclusters in the aerosol gradually decompose from large microclusters to small microclusters when absorbing radiated heat of refrigerant in the heat exchange pipe, wherein carbon dioxide refrigerant is condensed and liquefied by absorbing heat in a process of the aerosol decomposing from large microclusters to small microclusters, and the aerosol decomposes from large microclusters to small microclusters in a dynamic and continuous manner.

13. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 12, wherein the aerosol generating device comprises an enclosed housing, an air extraction device and a water atomization device, the air extraction device is used to form a negative pressure in the enclosed housing, the water atomization device is used to atomize liquid water into water mist with a larger specific surface area, the atomized water and air form an aerosol in the enclosed housing under the negative pressure, the aerosol enters the heat exchange chamber for heat exchanging, and water obtained after heat exchanging is directly discharged into an atmosphere.

14. The single-stage carbon dioxide multi-split cooling and heating multifunctional central air conditioner according to claim 13, wherein an inner wall of the enclosed housing and/or a surface of the heat exchange pipe is coated with a water-repellent agent to prevent water droplets from hanging on the inner wall or the surface.