[0005] European patent application EP 1,319,901 discloses a device comprising two Venturi-type devices positioned in series making it possible to mix so-called primary fresh air with so-called secondary recirculated air. Nevertheless, the inlet pressure of the second Venturi of the device is greatly insufficient, and does not make it possible to achieve a sufficient secondary air suction, and the ratio between secondary air and primary air is still insufficient.

Aim of the invention

[0006] The present invention aims to propose a dynamic cold beam air conditioning device, having reduced noise while offering an improved primary air/secondary (recirculated) air ratio.

[0007] According to certain preferred embodiments of the invention, it also aims to improve the thermal comfort related to the use of the device according to the invention.

Summary of the invention

[0008] The present invention relates to an air conditioning device comprising a primary air intake pipe ~~(chamber)~~ connected to the inlet of a first Venturi-type device ~~(induction unit)~~ whereof the suction communicates with a first secondary air intake pipe ~~(chamber)~~, the outlet of the first Venturi-type device communicating with the inlet of a second Venturi-type device ~~(induction unit)~~ whereof the suction is connected to a second secondary air intake pipe ~~(chamber)~~ comprising a main heat exchanger.

[0009] The outlet of this device communicates directly or indirectly with the room to be air conditioned.

[0010] Preferably, the first Venturi-type device comprises a primary air inlet nozzle comprising a diameter restriction at its free end, said free end emerging in a suction chamber communicating with the first secondary air intake pipe, said suction chamber comprising an outlet orifice across from the outlet of said inlet nozzle, said outlet orifice communicating with the inlet of the second Venturi-type device.

[0011] Advantageously, the second Venturi-type device comprises an intake ~~(or mixing)~~ chamber, the intake chamber having a section at least twice as large as the outlet orifice of the suction chamber of the first Venturi-type device.

[0012] Advantageously, the second Venturi-type device comprises a plate pierced with orifices, said plate separating the intake chamber communicating with the outlet of the first mixing device and a mixing chamber communicating with the second secondary air intake pipe, said orifices producing, during use, a Venturi effect suctioning the secondary air from the secondary air intake pipe.

[0013] Preferably, the device according to the invention comprises an adjustable gate or valve making it possible to inject primary air directly at the inlet of the second Venturi-type device, downstream from the first Venturi-type device, so as to be able to regulate the total mixture ratio between the primary air and the secondary air.

[0014] Advantageously, the first secondary air intake pipe comprises a second heat exchanger making it possible to cool the secondary air during use.

[0015] Preferably, the heat exchanger(s) comprise vertical fins, and a device discharging condensation at the bottom thereof.

[0016] A second aspect of the invention relate to a façade, a façade element or an element allowing access to the façade of a building comprising an air conditioning device according to any one of the preceding claims.

[0017] Advantageously, the façade according to the invention comprises two walls separated by a ventilation space, the first and second secondary air intake pipes communicating with said ventilation space.

[0018] The second wall may be of the curtain or helioscreen type, or preferably, the façade will be of the active façade type.

[0019] A third aspect of the invention relates to a method for air conditioning a confined space comprising the following steps:

a. drawing in outside air, called primary air, and bringing it to a predetermined pressure;

b. injecting said primary air into a Venturi-type device, suctioning from a suction chamber and mixing air from the confined space, called secondary air, with the primary air, the

CLAIMS

1. An air conditioning device ~~(10)~~ comprising a primary air intake pipe ~~(1)~~ connected to the inlet of a first Venturi-type device whereof the suction communicates with a first secondary air intake pipe ~~(9)~~, the outlet of the first Venturi-type device communicating with the inlet of a second Venturi-type device whereof the suction is connected to a second secondary air intake pipe ~~(11)~~ comprising a main heat exchanger ~~(8)~~, the first Venturi-type device comprising a primary air inlet nozzle ~~(3)~~ comprising a diameter restriction at its free end, said free end emerging in a suction chamber ~~(2)~~ communicating with the first secondary air intake pipe ~~(9)~~, said suction chamber ~~(2)~~ comprising an outlet orifice ~~(15)~~ across from the outlet of said inlet nozzle, said outlet orifice ~~(15)~~ communicating with the inlet of the second Venturi-type device, ~~characterized in that~~wherein the second Venturi-type device comprises an intake chamber ~~(4)~~, said intake chamber ~~(4)~~ having a section at least twice as large as the outlet orifice ~~(15)~~ of the suction chamber ~~(2)~~.

2. The air conditioning device ~~(10)~~ according to claim 1, wherein the second Venturi-type device comprises a plate ~~(14)~~ pierced with orifices ~~(5)~~, said plate separating the intake chamber ~~(4)~~ communicating with the outlet ~~(15)~~ of the first mixing device and a mixing chamber ~~(6)~~ communicating with the second secondary air intake pipe ~~(11)~~, said orifices ~~(5)~~ producing, during use, a Venturi effect suctioning the secondary air.

3. The air conditioning device ~~(10)~~ according to either one of the preceding claims, wherein the first secondary air intake pipe ~~(9)~~ comprises a secondary heat exchanger ~~(7)~~.

4. The air conditioning device ~~(10)~~ according to any one of the preceding claims, wherein the heat exchanger(s) comprise vertical fins, and a device discharging condensation at the bottom thereof.

5. The air conditioning device ~~(10)~~ according to any one of the preceding claims, wherein an adjustable gate makes it possible to inject primary air directly at the inlet of the second Venturi-type device, downstream from the first Venturi-type device,

so as to be able to regulate the total mixture ratio between the primary air and the secondary air.

6. A façade comprising an air conditioning device ~~(10)~~ according to any one of the preceding claims.

7. The façade according to claim 6, comprising two walls separated by a ventilation space, the first and second secondary air intake pipes being connected to said ventilation space.

8. A method for air conditioning a confined space comprising the following steps:

a. drawing in outside air ~~(18)~~, called primary air, and bringing it to a predetermined pressure;

b. injecting said primary air ~~(18)~~ into a Venturi-type device, suctioning from a suction chamber ~~(2)~~ and mixing air from the confined space, called secondary air ~~(17)~~, with the primary air, the secondary air passing, before mixing, into a first heat exchanger ~~(7)~~ regulated to a setpoint temperature thus obtaining a first air mixture ~~(19)~~;

c. injecting the first air mixture ~~(19)~~ into a second Venturi-type device, suctioning and mixing secondary air ~~(16)~~ with said first air mixture ~~(19)~~, the secondary air passing, before mixing, into a second heat exchanger ~~(8)~~ regulated to a setpoint temperature;

d. reinjecting the obtained air mixture into the confined space;

~~characterized in that~~wherein the first air mixture ~~(19)~~ is compressed in a mixing chamber ~~(4)~~ communicating with the outlet orifice ~~(15)~~ of the suction chamber ~~(2)~~, said intake chamber ~~(4)~~ having a section at least twice as large as the outlet orifice ~~(15)~~ of the suction chamber ~~(2)~~, so as to cause compression of the first air mixture ~~(19)~~.

9. The method according to claim 8, wherein said predetermined pressure is comprised between 100 and 1,000 Pa.

10. The method according to either one of claims 8 and 9, wherein the ratio between the intake of primary air and secondary air in the first mixing device is comprised between 0.7 and 2.5.

11. The method according to any one of claims 8 to 10, wherein the flow ratio between the intake of the first air mixture and secondary air in the second mixing device is comprised between 2 and 4.

12. The method according to any one of claims 8 to 11, wherein the pressure of the first air mixture at the inlet of the second Venturi device is comprised between 50 and 100 Pa.

13. The method according to any one of claims 8 to 12, wherein the secondary air flows in a ventilated space between two walls of an active façade before being suctioned through the heat exchangers ~~(7, 8)~~.

14. The method according to any one of claims 8 to 13, wherein the primary air drawn in in step (a) is brought to a predetermined temperature before being injected into said first Venturi-type device.