United States Patent

[11] 3,601,184

[72] Inventor **Jean Hauville**
25, Place Jules Ferry, F92, Montrouge, France

[21] Appl. No. **830,727**
[22] Filed **June 5, 1969**
[45] Patented **Aug. 24, 1971**

[54] **AIR EXCHANGING AND CONDITIONING DEVICE**
4 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **165/125**
[51] **Int. Cl.** **F24h 3/02**
[50] **Field of Search** 165/124, 125, 126

[56] **References Cited**
UNITED STATES PATENTS

2,116,145	5/1938	Findley	165/124 X
2,274,033	2/1942	Booth	165/125 X
2,332,707	10/1943	Findley	165/124
2,356,609	8/1944	Payne	165/127
2,368,732	2/1945	Wallgren	165/125 X
2,408,973	10/1946	Cody	165/125

Primary Examiner—Edward J. Michael
Attorneys—Robert E. Burns and Emmanuel J. Lobato

ABSTRACT: Air exchanger and conditioning device comprising a device for introducing fresh air and a device for extracting air contained in a given area, and a motor connected to both of said devices for driving the same at the same speed.

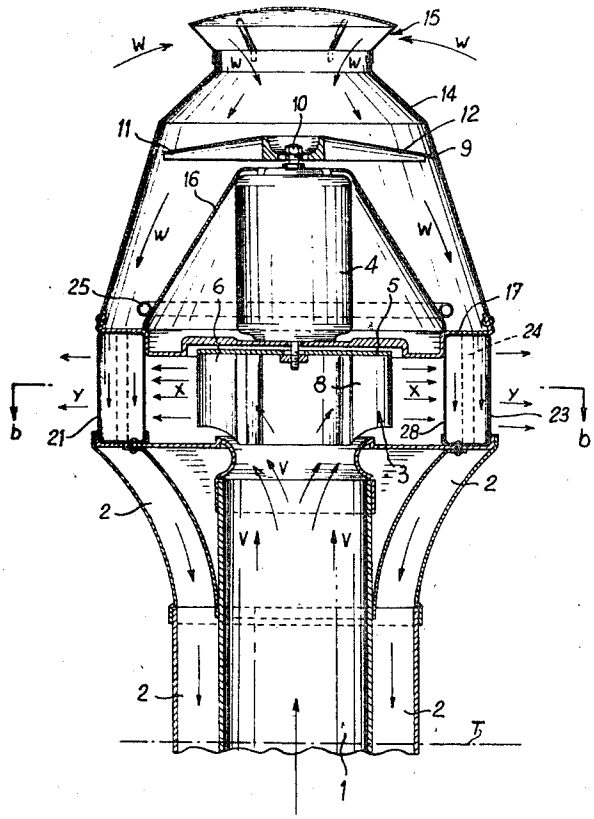


Fig. 1

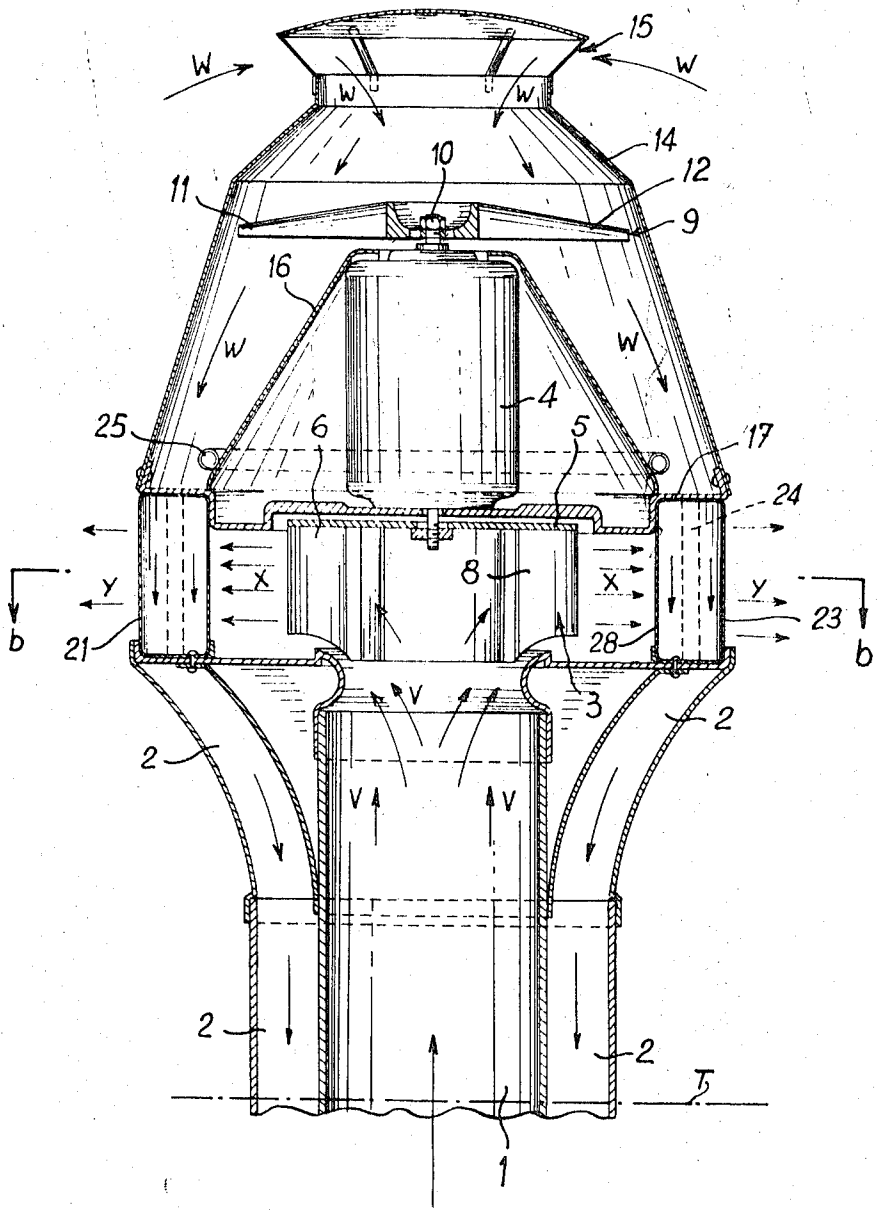

W
W
W
W
15
14
12
10
11
9
16
W
W
4
25
6
5
17
24
X
X
Y
Y
8
23
b
b
21
28
3
V
V
V
2
2
2
2
1
T

Fig. 2

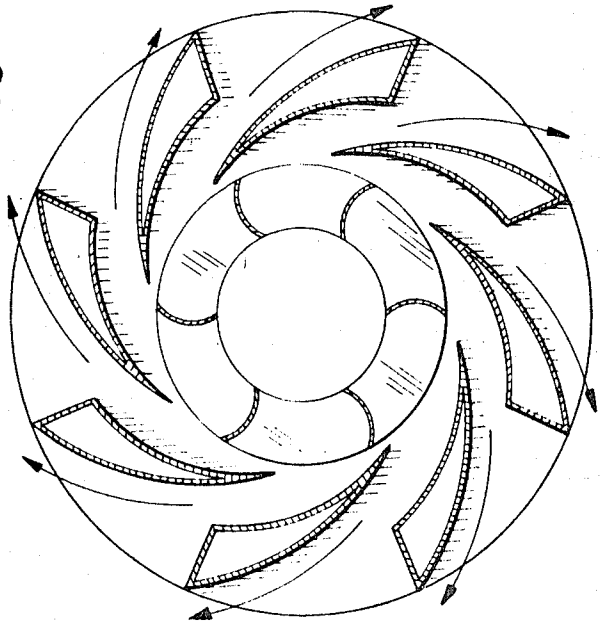


Fig. 3

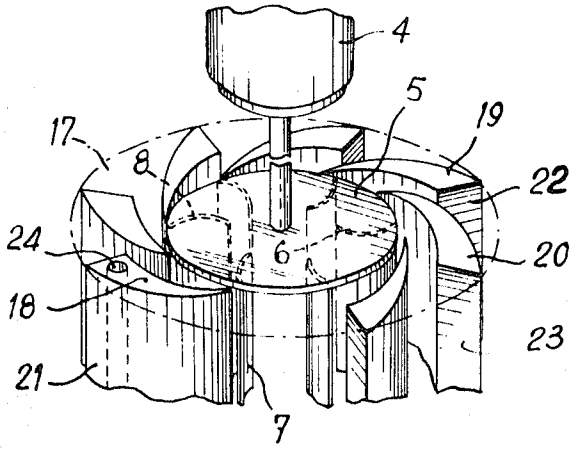


Fig. 4

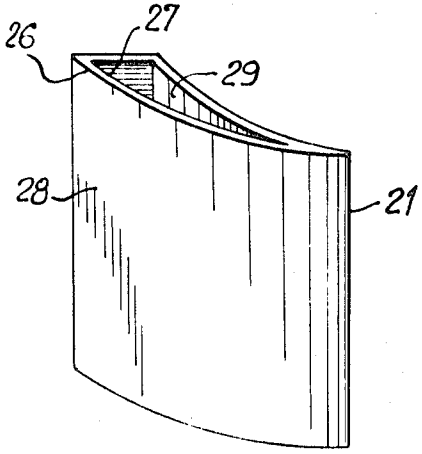


Fig. 5

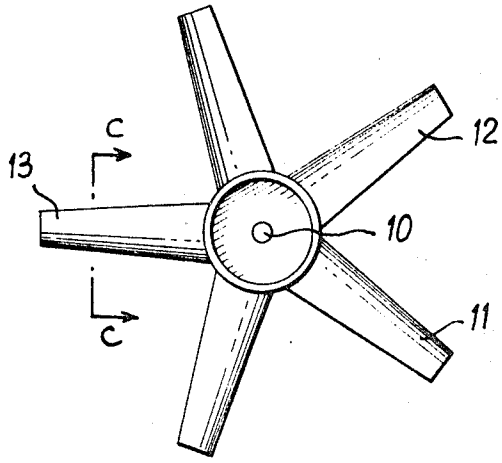
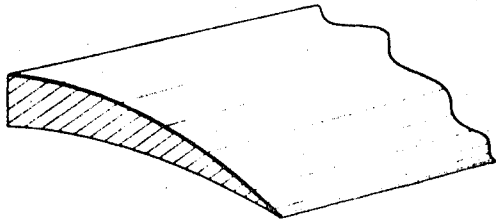


Fig. 6



AIR EXCHANGING AND CONDITIONING DEVICE

The present invention has, in effect, as its object, a device for exchanging and conditioning air characterized by the fact that the same motor drives at the same speed a centrifugal or axial device for extracting stale air contained in an enclosure and another centrifugal or axial device for pulsating fresh air.

The fresh air can be introduced in the enclosure along an outlet having a cross section equal to the cross section of the extracted air outlet and after passage of a series of peripheral conductors which can be equipped with the devices for conditioning air and the external surfaces of which serve as deflectors for the extracted air. In a modification, the extraction of stale air and the impulsion of fresh air, conditioned or not, can take place according to sections, pressures and outputs which are equal or different, depending upon the particular use under consideration.

Other advantages and characteristics of the invention will appear upon reading the following description which is given by way of nonlimiting example, reference being made to the accompanying drawing on which there is shown:

FIG. 1 a general vertical cross section of the device according to the invention.

FIG. 2 a view along BB of FIG. 1.

FIG. 3 a partial perspective view of the central parts of the device according to the invention.

FIG. 4 view of a conductor specially designed for refrigeration.

FIG. 5 top view of the propeller, and

FIG. 6 view taken along CC of FIG. 5.

Referring first to FIG. 1, there can be seen the ceiling or terrace located above the enclosure whose air is to be exchanged and in which there are provided orifices leading to extraction duct 1 and to the ringed shaped conductor 2 for bringing in fresh air. Extraction is ensured by the movement of the centrifugal fan 3 driven by motor 4, which fan is in reality formed simply (FIG. 3) of a disc 5 from which hang a certain number of straight blades 6, 7, 8, etc. This disc 5 and with it the wing 6 are rotated by motor 4 which can also move, at the same speed according to the essential characteristics of the invention, another device such as, a propeller or fan 9 for sucking by rotation. As shown in FIGS. 5 and 6, the movement of motor 4 is transmitted by shaft 10 when the rotational device is a propeller, it is composed for example of a certain number of blades 11, 12, 13, etc., the vertical cross section of which (FIG. 6) is a curvilinear triangle.

The upper part of the apparatus (FIG. 1) is covered with a hood 14, having at its upper part variously placed orifices designated by reference 15.

The result of movement of propeller 9 is to cause entrance (arrow W) of a mass of air and to push it along hood 16 which protects motor 4 up to the level of the pierced plane 17. As can be seen in dotted lines in FIG. 3, this plane 17 is pierced with a variable number of curvilinear triangular openings, 18, 19, 20 which are in reality the upper bases of prisms 21, 22, 23, etc. which communicate with the upper part of the angular conduit 2.

FIG. 4 shows by way of example what can be the external profile of conduits 21, 22, 23. The blades 6, 8, 9 are rotated by motor 4 to pull in (arrow V) the air, and then push (arrow X) laterally the air into contact with the curved surfaces of these prisms, 21, 22, 23 which serve as interrupting deflectors upon the discharged air (arrows Y). The operation of this device is as follows: the motor 4 drives at the same speed the fan 3 and the blades 6, 7, 8 which suck in air (arrow V) and eject it (arrows X and Y) with the intermediary of the deflectors, and the propeller 9 which sucks in and ejects (arrows W) the same

volume of air which passes through the hollow channels 21, 22, 23, and reaches up to the peripheral duct 2 by which it is injected into the room. The similarity of speeds or rotation of two-motor members and of the area of the cross sections of the extraction cylinder 1 and of the cylindrical inlet ring 2 ensures that the enclosure can neither be undervacuumed nor pressurized.

Moreover, and according to another characteristic of the present invention, this new air can be conditioned.

Shown in FIG. 1, in dotted lines is a heating device, formed for example by electrical resistances as indicated by reference numeral 24. This device (FIG. 3) is located in the center of a volume of a prism such as prism 21. Air passing longitudinally through said prism is thus heated.

It is also possible to imagine an angular heating device 25 (FIG. 1) and any devices contributing to the radiation and the emission of heat.

Refrigeration can similarly be ensured with the air of prisms 21, 22, 23 etc. It would suffice, for example to equip these with two walls, 26 and 27 (FIG. 4) and to place between these two walls a spongy product which can rapidly become humid. The air (arrows X) arriving at high speed on surface 28 which forms a deflector of a prism 21 causes the evaporation of the liquid retained by the spongy body retained in walls 26 and 27. This evaporation effects refrigeration of the liquid passing in the central corridor 29 of the prism 21.

It will of course not be possible to depart from the scope of the invention by substituting for these heating and cooling devices other conventional devices such as humidification of air operating by pulverization, dust removers using filtering media or elements combined with the extraction and impulsion devices, characterized as in the present application. The invention will also not be departed from by adding other conditioning devices or by moving the inlet or outlet ducts with respect to the rest of the apparatus, nor by blowing pulsed air directly round the motor in one or several ducts. Additionally, one at least of the extracting and pulsating devices can be centrifugal or axial.

What I claim is:

1. An air exchanger comprising, a driven exhaust blower for exhausting a given volume of exhaust air from a given space, a driven intake blower for introducing a volume of intake air into said space equal to said given volume, drive means common to said exhaust blower and said intake blower driving both blowers at equal speeds simultaneously, means defining an exhaust duct for exhausting said exhaust air, means defining an intake duct coaxial with the exhaust duct for introducing intake air in a volume equal to the volume of air exhausted, said intake duct comprising an annular portion disposed circumferentially of the exhaust duct, and said exhaust duct and said intake duct having an equal volume, whereby the air pressure is maintained constant in said space.

2. An air exchanger according to claim 1, in which said exhaust blower comprises a centrifugal blower and in which said intake blower comprises an axial blower.

3. An air exchanger according to claim 2, in which said means defining said intake duct comprises stationary, hollow vanes disposed circumferentially spaced around said centrifugal blower, and said stationary vanes being disposed in position for airflow from said axial blower to pass therethrough and exhaust air discharged from said centrifugal blower to flow therebetween, and said annular portion of said intake duct being disposed downstream of said hollow vanes and in communication therewith.

4. An air exchanger according to claim 3, in which said axial blower is disposed upstream of said hollow vanes.