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(54) **Terminal apparatus, e.g. ceiling diffuser, of a ventilation system**

Endgerät, z. B. Deckendiffusor, eines Belüftungssystem

Appareil terminal d'un système de ventilation, par ex. diffuseur de plafond

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EP 2 096 366 B1

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Description

[0001] The object of this invention is a terminal apparatus of a ventilation duct, e.g. a ceiling diffuser, via which the incoming air is directed into a room space or corresponding, and in which ceiling diffuser the flow aperture leading into the room space is adjustable in height, and for which adjustment the terminal apparatus comprises an electric motor, an airflow velocity sensor installed in the aforementioned flow aperture or in its immediate proximity for giving a signal to the electric motor, as well as a motor controller and a regulator.

[0002] The invention thus relates to the terminal apparatus of a ventilation duct, with which air is supplied into a room space. One example of a terminal apparatus in which the invention can be utilized is a so-called ceiling diffuser. Thus in the following a ceiling diffuser is described, but the invention can also be utilized in other terminal apparatuses.

[0003] The purpose of the ceiling diffuser or other corresponding terminal apparatus is that by means of it the desired quantity of air is brought into the room space without draughts such that the desired mixing is achieved. When supplying air to the room via the ceiling diffuser, one problem that often occurs is that the flow length of the air current depends on the magnitude and temperature of the air current. With small air currents and cold inlet air the throw length is small and correspondingly with large air currents and warm inlet air the throw length is large.

[0004] It is necessary to permanently place the air deflectors of diffusers in a manner such that in different operating modes sufficiently good mixing of the air is achieved in the room without however causing a feeling that there is a draught. Systems in which the quantity of the air current is controlled according to use, e.g. according to room temperature or CO₂ content, are particularly problematic.

[0005] A solution with the same objective as in this invention, i.e. directing air into a room space without draughts is known, e.g. according SE patent 520294 (Lindinvent AB). The air current coming from the ceiling diffuser is regulated according to this publication by means of different measured parameters, such as a pressure measurement. Arranging a pressure measurement is expensive. In addition the calculation formulae are complex. Another drawback in this solution is the dependency on other system components and on the information obtained from them.

[0006] Another prior art publication is EP 1 840 476 A2. In this publication the flow aperture can be adjusted and the adjustment takes place with linear movement. Further, this publication shows an airflow velocity sensor. A motor is controlled by the signal from the airflow velocity sensor, the motor then changing the flow aperture.

[0007] However, EP 1 840 476 A2 is a duct product, not a terminal apparatus. In this publication, the amount of air flow is controlled, not the air velocity. The airflow

sensor is situated in the duct. Further, the flow aperture is adjusted with a two part plate system, namely a static damper plate and a movable damper plate. Further, the air flow control apparatus according to this publication is used in only constant pressure ventilating systems.

[0008] The purpose of this invention is to achieve a simpler and more reliable terminal element of a ventilation system than before, with which air can be brought into a room space evenly and without draughts. The terminal apparatus according to the invention is characterized in that the airflow velocity sensor, the regulator and the motor controller are integrated into a circuit card, which is connected to the electric motor, which opens and closes a plate that is movable in the ceiling diffuser, e.g. a separate deflector plate or diffuser plate.

[0009] One preferred embodiment of the terminal apparatus according to the invention is characterized in that the circuit card has been connected to the electric motor with a conductor.

[0010] Another preferred embodiment of the terminal apparatus according to the invention is characterized in that the circuit card is fixed with a quick clamping to the deflector plate or the diffuser plate of the ceiling diffuser.

[0011] The advantages of the invention that can be mentioned is that the solution is simple to implement. Only a flow velocity sensor, a regulator and an actuator, i.e. a motor, are needed. As a consequence of this the solution is also inexpensive in price. The operation of the regulator does not require information from outside the diffuser, but instead the diffuser with the regulator and sensor can be a fully independent product. That being the case there is no need for data transfer and no need for system integration either.

[0012] The invention is suited for use also with constant flow appliances without more special system integration.

[0013] One room space or zone can contain a number of independent diffusers, each of which regulates its own air jet velocity.

[0014] Yet another advantage of the invention that can be mentioned is that it can very simply be taken into use in some existing diffusers, such that the flow velocity regulator is an additional part.

[0015] In the following, the invention will be described in more detail by the aid of some preferred embodiments with reference to the attached drawing, which presents a section of the ceiling diffuser according to the invention. Although the focus here is on a ceiling diffuser, any other terminal apparatus of a ventilation system, via which the airflow is directed into a room space or similar, can be relevant. The airflow is roughly presented in the figure with drawn arrows. The ceiling diffuser is generally round or rectangular in shape, e.g. of a square shape. Other shapes are also possible within the scope of the invention.

[0016] The body 1 of the ceiling diffuser is installed against the ceiling as an extension of the air duct 2 extending through an aperture made in the ceiling 3 in a manner that is in itself prior art. The truss, with which the

threaded spindle 5 is installed into the ceiling diffuser, is marked with the reference number 4. The diffuser plate is installed by means of the threaded spindle 5. An actuator 7, such as a motor, can be installed between them. The height of the aperture between the diffuser plate 2 and the body 1 of the ceiling diffuser can thus be regulated by means of the motor.

[0017] In the invention it is novel to dispose a flow velocity sensor 8 in the output aperture of the air current or in its immediate proximity in the way that the measurement message given by it is representative from the standpoint of the functioning of the appliance in question. The value measured by the sensor 8 is transmitted to the regulator. The regulator measures the temperature of the incoming air and possibly also the temperature of the room air and calculates on the basis of these a suitable set value for the flow velocity. Often it is sufficient that the same flow velocity is used in all the relevant operating situations, in which case the set value of the flow velocity can be a constant and no temperature compensation is needed.

[0018] The invention can be used together with constant flow regulators, i.e. CFRs, such that the CFR manages the regulation/control of the air quantity and the diffuser manages the mixing of the air. As the air quantity increases and the flap of the CFR louver opens, the pressure of the diffuser increases. A consequence of this is an increase in the velocity of the air jet, which the diffuser attempts to reduce by opening the inlet aperture of the air so that it is bigger. There can be a number of diffusers behind one constant flow appliance. The diffuser plate 6 can thus move in the manner indicated by the arrow 9, in which case the port of the air to the space decreases or increases correspondingly.

[0019] One preferred method to implement the invention is a circuit card, into which a velocity sensor 8, a regulator and motor controller are integrated. The circuit card can be fixed to the diffuser plate 6, or alternatively to a separate deflector plate, with a quick clamp such that the velocity sensor 8 comes to the desired point. The circuit card is connected with a conductor to the electric motor 7, which opens and closes a diffuser plate 6 (arrow 9) or a separate deflector plate. A power supply is arranged to the motor, then onwards from there to the circuit card.

[0020] It is obvious to the person skilled in the art that the invention is not limited to the embodiments presented above, but that it can be varied within the scope of the claims presented below.

[0021] The description does not explain in more detail how the movement of the diffuser plate in the vertical direction is mechanically implemented in practice, because the construction of it is in itself easy for a person skilled in the art and nothing novel is connected with it.

Claims

1. Terminal apparatus of a ventilation duct, e.g. a ceiling diffuser, via which the incoming air is directed into a room space or corresponding, and in which ceiling diffuser the flow aperture leading into the room space is adjustable in height, and for which adjustment the terminal apparatus comprises an electric motor (7), an airflow velocity sensor (8) installed in the aforementioned flow aperture or in its immediate proximity for giving a signal to the electric motor, as well as a motor controller and a regulator, **characterized in that** the airflow velocity sensor (8), the regulator and the motor controller are integrated into a circuit card, which is connected to the electric motor (7), which opens and closes a plate that is movable in the ceiling diffuser, e.g. a separate deflector plate or diffuser plate (6).
2. Terminal apparatus according to claim 1, **characterized in that** the circuit card has been connected to the electric motor (7) with a conductor.
3. Terminal apparatus according to claim 1 or 2, **characterized in that** the circuit card is fixed with a quick clamping to the deflector plate or the diffuser plate (6) of the ceiling diffuser.

Patentansprüche

1. **Endeinrichtung oder Abschlusseinrichtung** eines Ventilationskanals oder eines Ventilationsrohres, z.B. ein Deckendiffusor, über welchen die ankommende Luft in ein Zimmer oder einen Raum oder ähnliches leit- oder lenkbar ist, wobei die Strömungsöffnung, die in den Raum oder das Zimmer führt, der Höhe nach verstellbar ist, wozu die Einrichtung eine elektrischen Motor (7), einen Luftstrom-Geschwindigkeits-Sensor (8), welcher in der Strömungsöffnung oder ihrer unmittelbaren Nachbarschaft angeordnet ist, zur Abgabe eines Signals an den elektrischen Motor, und eine Motor-Ansteuerung wie auch einen Regler aufweist, **dadurch gekennzeichnet, dass** der Luftstrom-Geschwindigkeits-Sensor (8), der Regler und die Motor-Ansteuerung auf einer oder in einer Leiterkarte (circuit card) integriert sind, welche mit dem elektrischen Motor (7) verbunden ist, der eine Platte öffnet und schließt, welche in der Einrichtung bewegbar ist, z.B. eine separate Ablenkplatte oder eine Diffusorplatte (6).
2. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Leiterkarte mit dem elektrischen Motor (7) über einen Leiter verbunden wurde.
3. Einrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** die Leiterkarte mit einer

Schnellverbindung klemmend an der Ablenkplatte oder der Diffusorplatte (6) der Deckeneinrichtung fixiert ist.

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Revendications

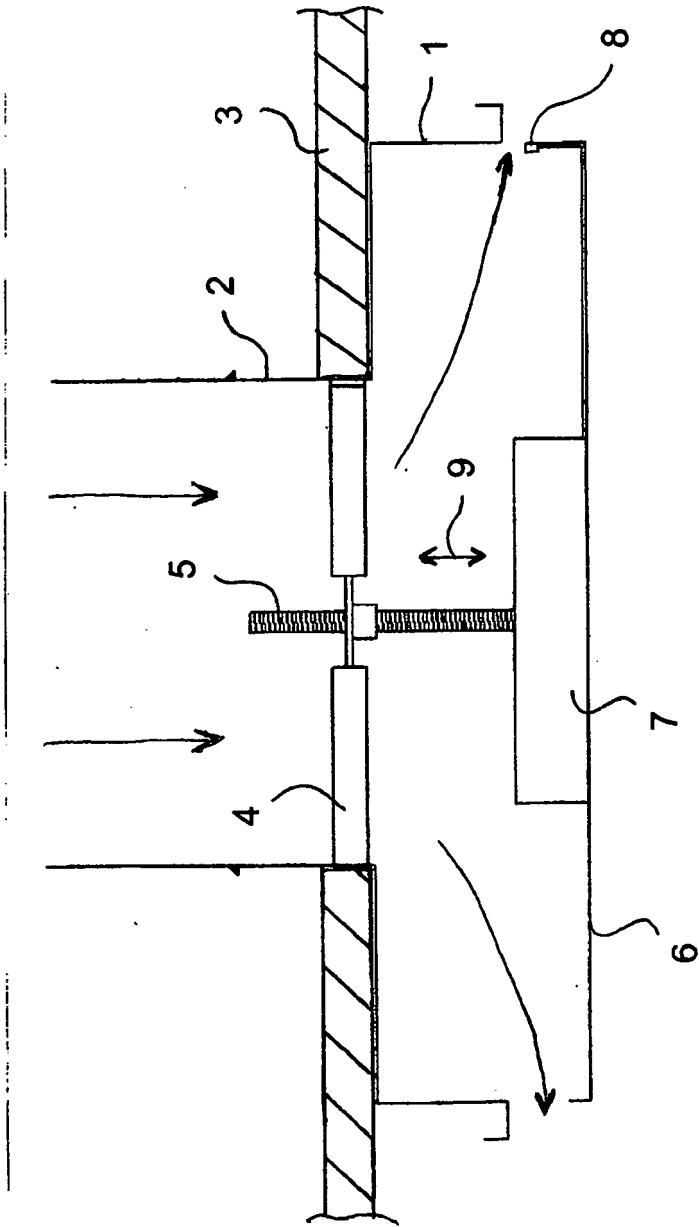
1. Appareil terminal d'un conduit de ventilation, par exemple d'un diffuseur de plafond, par lequel l'air entrant est dirigé vers l'espace d'une pièce ou une zone correspondante, et dans lequel diffuseur de plafond l'orifice d'écoulement qui mène dans l'espace de la pièce est réglable en hauteur, l'appareil terminal comprenant pour ce réglage un moteur électrique (7), un capteur de vitesse d'écoulement d'air (8) installé dans ledit orifice d'écoulement ou à proximité immédiate de celui-ci pour émettre un signal vers le moteur électrique, ainsi qu'une commande de moteur et un régulateur, **caractérisé en ce que** le capteur de vitesse d'écoulement d'air (8), le régulateur et la commande de moteur sont intégrés dans une carte de circuit imprimé qui est reliée au moteur électrique (7), qui ouvre et ferme une plaque mobile dans le diffuseur de plafond, par exemple une plaque de déviation ou plaque de diffuseur (6) séparée.
2. Appareil terminal selon la revendication 1, **caractérisé en ce que** la carte de circuit imprimé a été reliée au moteur électrique (7) à l'aide d'un conducteur.
3. Appareil terminal selon la revendication 1 ou 2, **caractérisé en ce que** la carte de circuit imprimé est fixée à l'aide d'un raccordement rapide à la plaque de déviation ou à la plaque de diffuseur (6) du diffuseur de plafond.

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- SE 520294 [0005]
- EP 1840476 A2 [0006] [0007]