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(54) **A device for ventilation and cooling and/or heating rooms**

Vorrichtung zum Belüften, Kühlen und/oder Beheizen eines Raumes

Dispositif pour la ventilation, le refroidissement et /ou le chauffage de locaux

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Description

[0001] The present invention relates to a ceiling mounted device for ventilating rooms and, at the same time, cooling and/or heating the room air, said device including a cooling/heating baffle which has a longitudinal channel for the supply of primary air, a room air cooling/heating coil, a mixing chamber for mixing cooled/heated room air and primary air, means for supplying primary air to the mixing chamber through the medium of an induction effect which serves to suck room air into the device and also to pass said air through the cooling/heating coil, and one or more outlets for a mixture of cooled/heated room air and primary air flowing out from the device essentially horizontally the ceiling of the room.

[0002] Devices of the aforesaid kind are also referred to as cooling baffles or false ceiling panels. Such devices are known for treating room air and are available in different designs, including designs in which natural ventilation generated by a chimney effect is used instead of primary air, although a common feature of those cooling baffles that use primary air of the aforesaid kind is that they include one or more primary air channels to which primary air can be delivered through a central air-conditioning plant installed either in the building concerned or in the proximity of said building, or which is sucked-in from outside by fans provided to this end, so that the pressure in the primary air channel will always be higher than atmospheric pressure. The primary air is blown into the baffle interior through such devices as nozzles for instance, and the influence of said pressure. There is thus generated an induction effect which serves to draw room air from said room and through the cooling battery and into the mixing chamber in the baffle interior, where the primary air and the room air sucked into the device as a result of said induction effect are mixed together. The resultant air mixture then flows through one or more outlet channels into the room with the aid of the primary air as a transporting medium. Such devices that operate with an inductor effect are described in WO-9809115, GB-A-1011742, GB-A-1274540, GB-A-1468754, GB-A-2271175 and DE-A-3321612, for instance. All of these known devices are referred to as air-conditioners, since they concern both the cooling and heating of room air and it would be obvious for those skilled in this art to equip the cooling baffles with means for delivering hot water to the cooling elements (the heat exchanger) if so desired, so as to enable the devices to be used for both cooling and heating purposes. One advantage with cooling baffles in comparison with ventilating and air-conditioning apparatus is that cooling baffles are lean in energy and do not generate draughts. The level of noise generated is also relatively low.

[0003] However, all manufacturers of cooling/heating baffles and similar devices intended for conditioning room air in public premises endeavour to provide the best possible flexible and cost-effective solutions.

Among other things, there should be sought from the aspect of installation solutions that are so simple as to prevent the need for ventilation being neglected for reasons of cost in favour of the need to cool or heat the air in such rooms. A high air requirement in public rooms can force the installation of larger, and therewith less cost-effective, baffles than are actually justified from a cooling/heating aspect.

[0004] An object of the present invention is to provide a device for cooling and/or heating air in larger rooms or in densely populated rooms, so that ventilation and cooling/heating requirements can both be achieved in the individual case in a simple and effective manner with respect to both installation and apparatus, and also in a manner which is competitive and also attractive from a cost aspect. The invention is characterised to this end by the features set forth in the accompanying Claims.

[0005] Thus, the inventive device includes a baffle in which supply air nozzles are provided for supplying primary air from the primary air channel to the room concerned. These nozzles are disposed in one or more of the baffle walls delimiting the primary air channel. The nozzles can be conveniently turned to enable the air to flow in different directions, essentially transversely to the axis about which the nozzle is turned. To enable cooperation with respect to control possibilities between the cooled room air/primary air mixture with the primary air delivered through nozzles, supply air nozzles are arranged immediately outside one or both of said outlet openings in the flow direction of the cooled room air/primary air mixture.

[0006] The device may have different configurations and constructions within the scope of the invention, and may include baffle constructions of an earlier known type combined with supply air nozzles according to the invention, although the device will be described hereinafter with reference to a preferred baffle embodiment.

[0007] The invention will now be described in more detail with reference to the accompanying drawing, the single Figure of which is a cross-sectional view of a preferred embodiment of a ventilation and cooling/heating device that includes a baffle 10. The baffle 10 has a primary air channel 11 to which primary air 12 is delivered from an external source (not shown). The baffle 10 includes an outer casing 13 which delimits the primary air channel 11 outwards, and inner walls 14 which delimit the primary air channel 11 against other parts of the baffle, which include a lower part 15 having a lower plate 16 which forms an outer, lower delimiting wall 17 of the lower part 15 and two outlet channel walls 18 and which together with an upper plate 19 also forms an upper delimiting wall of the lower part 15, said plates preferably being removable. The lower part 15 also accommodates one or more cooling/heating coils 20 mounted in coil holders 21 for cooling/heating room air that flows in through openings (not shown) in the lower wall 17, as shown by arrows. Formed between the outlet channel walls 18 of the lower part 15 and the inner walls 14 br-

dering on the first space 11 of the primary air channel are outlet channels 22 from a mixing chamber 23, said outlet channels opening out at a level with the lower part of the outer casing 13, which is normally placed on a level with the false ceiling of the room concerned. The mixing chamber 23 is arranged above the lower part 15 and is downwardly delimited by the upper plate 19 of the lower part 15 and laterally by parts of the inner walls 14 bordering on the primary air channel 11. Provided in the upper part of respective inner walls 14 are nozzles 29 for blowing primary air from the primary air channel 11 into the mixing chamber 23, as shown by arrows, said nozzles being mutually spaced in the longitudinal direction of the baffle 10. Located immediately outside the exit orifice of the outflow channel 22 are supply air nozzles 30, said supply air constituting in practice the primary air that flows in the primary air channel 11, said nozzles being mutually spaced in the casing 13 in the longitudinal direction of the baffle. The nozzles 30 are mounted so that they can be turned around a vertical axis and therewith enable supply air through the nozzles 30 to be delivered in different directions, according to local requirements and wishes.

[0008] If it is wished to deliver primary air to the room from the primary air channel 11 of the baffle 10 for ventilation purposes, nozzles 30a of the same kind as the nozzles 30 may be provided at appropriate positions on the baffle 10 adjacent the primary air channel 11. Further nozzles 30b similar to nozzles 30 may be provided in one or in both of the outlet channels 22 with the intention of being mixed with and coacting with the cooled air mixture that flows down from the mixing chamber 23. It lies within the scope of the invention to adapt the number of nozzles 30, 30a and 30b and their positions so as to achieve the best possible comfort in the room, both with respect to ventilation and cooling/heating requirements. In this regard, it may be unsuitable to place nozzles 30 in the lower part of the baffle 10 because of draughts for instance, whereas in other cases a combination of nozzles 30 and 30a or 30b may be preferred.

[0009] When the baffle 10 is used, primary air 12 will be blown in through the nozzles 29 as a result of the overpressure in the primary air channel 11, therewith forming a subpressure in the mixing chamber 23, this subpressure contributing towards the suction of room air (as a result of an induction effect) as shown by the upwardly pointing arrows in the centre of the Figure, and up through the cooling coil 20 and into the mixing chamber 23. The primary air blown through the nozzles 29 is transported by the room air sucked-in by induction, down through the outlet channels 22 and along the ceiling of the room, as shown by arrows. When the outflowing cooled/heated air meets the supply air (primary air) delivered through the nozzles 30 in the nozzle rows on either side of the outlet orifices of the outflow channels 22, the air will mix with the supply air and flow essentially in the direction of said air, as indicated by the arrows. This enables the air distribution pattern in the room to

be readily controlled and/or changed in a particularly flexible manner, therewith contributing towards a better climate and greater comfort.

[0010] As inferred above, supply air from the primary air channel 11 can also be delivered to the room through nozzles 30a on the upper side or one or both of the vertical side walls of the baffle 11, therewith providing necessary ventilation of the room and also generating a multiple of flow patterns around the baffle 10 without requiring the use of separate supply air devices. The baffle 10 may also be provided with nozzles 30b in one or both outlet channels 22, so that supply air will be mixed with the cooled air mixture prior to said mixture reaching the outlet opening, and therewith enable the outgoing air stream to be controlled to some extent already in the outlet channels 22.

[0011] It will be seen that the invention enables the cooling/heating requirement of a room to be achieved by dimensioning the length of the baffle, whereas the air requirement can be satisfied with the aid of rotatable nozzles provided in the baffle for supply air from the primary air channel. In many instances, this can result in a shorter length and therewith in smaller dimensions of the cooling/heating baffles and may also replace separate supply air devices, therewith resulting in a more cost-effective solution to the air-conditioning problem for many localities.

30 Claims

1. A ceiling mounted device for ventilating rooms and, at the same time, cooling and/or heating room air, said device including a cooling/heating baffle (10) which has a longitudinal primary air supply channel (11), a room air cooling/heating coil (20), a mixing chamber (23) for mixing cooled/heated room air and primary air, means (29) for supplying primary air to the mixing chamber (23) through the medium of an induction effect which serves to suck room air into the device and to pass said air through the cooling/heating coil (20), and one or more outlet opening channels (22) for a mixture of cooled/heated room air and primary air that flows out generally horizontally along the ceiling of the room, **characterised in that** said means (29) consist of nozzles provided in an inner wall (14) delimiting the primary air supply (11) from remaining parts of the baffle **in that** part of the wall which delimits the primary air supply (11) from the mixing chamber (23) and **in that** supply air nozzles (30,30a) which supply primary air from the primary air channel (11) directly to the room are disposed in one or more of the walls belonging to a casing (13) of the baffle that delimit the primary air channel (11).
2. A device according to Claim 1, **characterised in that** supply air nozzles (30a) are provided immedi-

ately outside one or both of said outlet channels (22) in the flow direction of the air mixture, for coaction with the air mixture and for controlling the total outgoing airflow.

3. A device according to Claim 1 or 2, **characterised in that** air supply nozzles (30b) for the supply of primary air from the primary air supply channel (11) also are provided **in that** part of the wall (14) which adjoins an outlet channel.
4. A device according to any of Claims 1-3, **characterised in that** the supply air nozzles (30,30a,30b) are rotatable so as to enable air to flow in different directions, essentially transversely to the axis about which the nozzles are turned.

Patentansprüche

1. An der Decke befestigte Vorrichtung zum Belüften von Räumen und, gleichzeitig, Kühlen und/oder Erwärmen von Raumluft, wobei die Vorrichtung folgendes umfaßt: eine Kühl-/Heizluftleitblechanordnung (10), die einen langgestreckten Primärluftzuführungskanal (11) besitzt, einen Raumluftkühl- bzw. -heizkörper (20), eine Mischkammer (23) zum Mischen von gekühlter/erwärmter Raumluft und Primärluft, Mittel (29) zum Zuführen von Primärluft zu der Mischkammer (23), wobei die Primärluft mit Hilfe eines Ansaugeffekts dazu dient, Raumluft in die Vorrichtung zu saugen und die Luft durch den Kühl-/Heizkörper (20) zu führen, und einen oder mehrere Kanäle (22) mit einer Auslaßöffnung für eine Mischung von gekühlter/erwärmter Raumluft und Primärluft, die im allgemeinen horizontal entlang der Decke des Raumes ausströmt, **dadurch gekennzeichnet, daß** die Mittel (29) aus Düsen bestehen, die in einer Innenwand (14) vorgesehen sind, die die Primärluftzuführung (11) gegen die übrigen Teile der Luftleitblechanordnung in jenem Teil der Wand abgrenzt, der die Primärluftzuführung (11) gegen die Mischkammer (23) abgrenzt, und daß Zuluftdüsen (30, 30a), die Primärluft aus dem Primärluftkanal (11) direkt dem Raum zuführen, in einer oder mehreren der zu einem Gehäuse (13) der Luftleitblechanordnung gehörigen Wände angeordnet sind, die den Primärluftkanal (11) begrenzen.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, daß** Zuluftdüsen (30a) unmittelbar außerhalb von einem oder beiden der Auslaßkanäle (22) in Strömungsrichtung der Luftmischung vorgesehen sind, um mit der Luftmischung zusammenzuwirken und den gesamten ausströmenden Luftstrom zu steuern.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, daß** Zuluftdüsen (30b) für die Zufuhr von Primärluft aus dem Primärluftzuführungskanal (11) ebenfalls in dem Teil der Wand (14) vorgesehen sind, der an einen Auslaßkanal angrenzt.

4. Vorrichtung nach einem der Ansprüche 1-3, **dadurch gekennzeichnet, daß** die Zuluftdüsen (30,30a,30b) drehbar sind, damit Luft in unterschiedliche Richtungen strömen kann, im wesentlichen quer zu der Achse, um die die Düsen gedreht werden.

15 Revendications

1. Un dispositif monté au plafond pour la ventilation de locaux et, en même temps, le refroidissement et/ou le chauffage de l'air du local, ledit dispositif comprenant un déflecteur de chauffage/refroidissement (10) qui présente une canalisation longitudinale (11) d'amenée d'air primaire, un bobinage de chauffage/refroidissement (20) de l'air de local, une chambre de mélange (23) pour mélanger l'air refroidi/réchauffé du local et l'air primaire, des moyens (29) pour amener l'air primaire vers la chambre de mélange (23) par l'intermédiaire d'un effet d'induction qui sert à aspirer l'air du local dans le dispositif et à faire passer ledit air à travers le bobinage de refroidissement/chauffage (20), et une ou plusieurs canalisations formant ouverture de sortie (22) pour un mélange d'air refroidi/réchauffé du local et d'air primaire qui sort en s'écoulant de manière généralement horizontale le long du plafond du local, **caractérisé en ce que** lesdits moyens (29) se composent de buses prévues dans une paroi interne (14) délimitant l'amenée d'air primaire (11) en provenance de parties restantes du déflecteur dans cette partie de la paroi qui délimite l'amenée d'air primaire (11) en provenance de la chambre de mélange (23) et **en ce que** des buses d'amenée d'air (30, 30a) qui amènent l'air primaire en provenant de la canalisation d'air primaire (11) directement vers le local sont disposées dans une ou plusieurs des parois appartenant à un boîtier (13) du déflecteur qui délimite la canalisation d'air primaire (11).
2. Un dispositif selon la revendication 1, **caractérisé en ce que** des buses d'amenée d'air (30a) sont prévues immédiatement à l'extérieur d'une ou de deux desdites canalisations de sortie (22) dans la direction d'écoulement du mélange d'air, pour co-agir avec le mélange d'air et pour réguler l'écoulement total de sortie d'air.
3. Un dispositif selon la revendication 1 ou 2, **caractérisé en ce que** des buses d'amenée d'air (30b) pour l'amenée d'air primaire en provenance de la

canalisation d'amenée d'air primaire (11) sont également prévues dans la partie de la paroi (14) qui est contiguë à une canalisation de sortie.

4. Un dispositif selon l'une quelconque des revendications 1 à 3, **caractérisé en ce que** les buses d'amenée d'air (30, 30a, 30b) peuvent tourner afin de permettre à l'air de s'écouler dans différentes directions, de manière essentiellement transversale à l'axe autour duquel les buses sont amenées à tourner.

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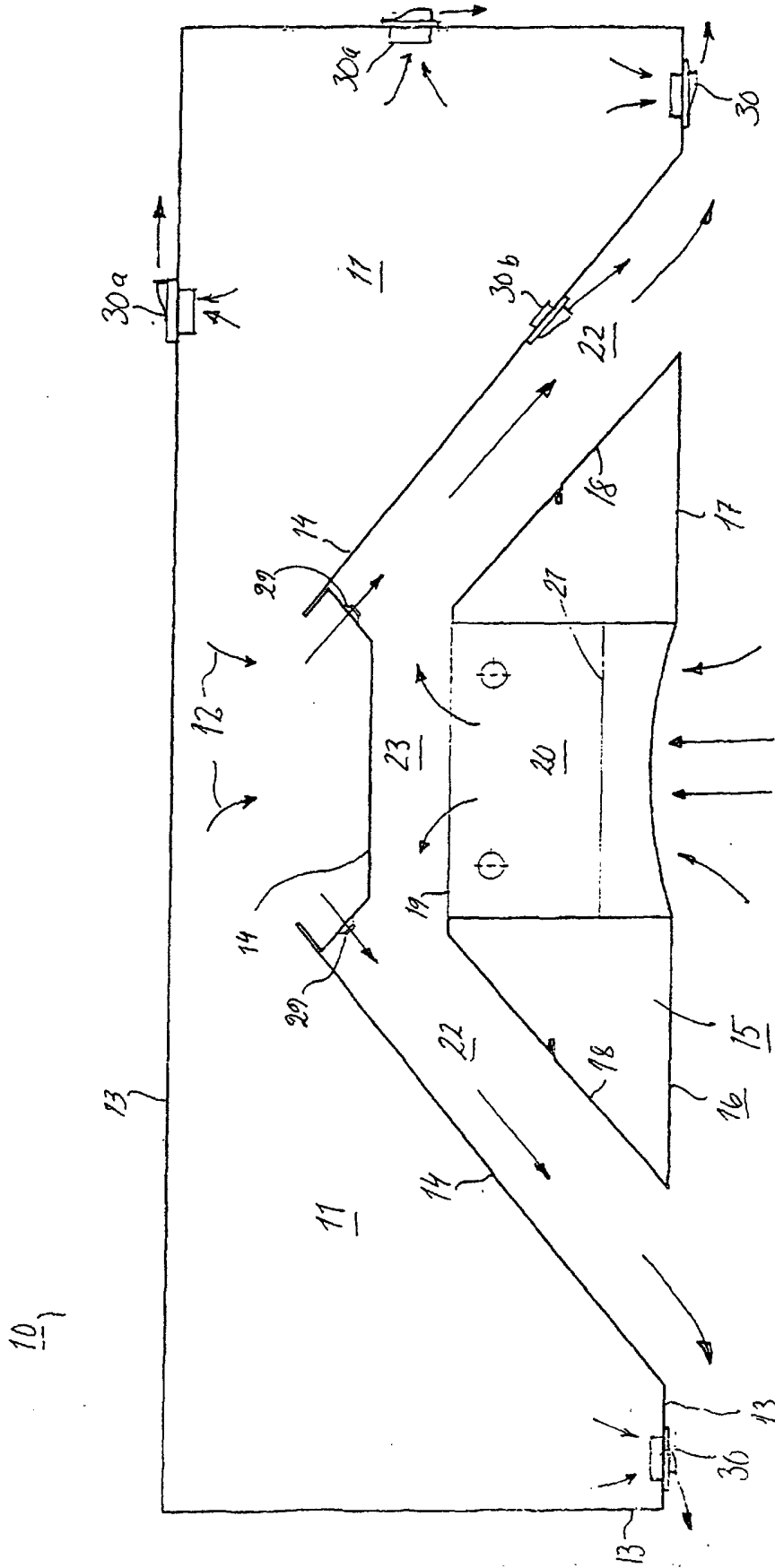


Fig.