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(54) Induction diffuser for air conditioning installations

(57) This is the description of an induction diffuser, of the type that is anchored to the ceiling of an enclosed area to diffuse non isothermal air towards the inner space of the enclosed area. It has a truncated cone shape and designed inside in a cylindrical shape so it can be connected to the plenum that feeds the treated air. Inside the plenum there are two sub-casings placed one on top of the other, respectively concentric with each other and with the outer casing. They are joined by the perimeter edge of their larger base with respect to a front closing plate, aided by different sized uprights, aligned according to two circumferential lines, equally spaced at an angle and the front closing plate has a central orifice facing the innermost sub-casing, and has a smaller diameter than the base of the latter. The front plate has been designed with a radially variable thickness.

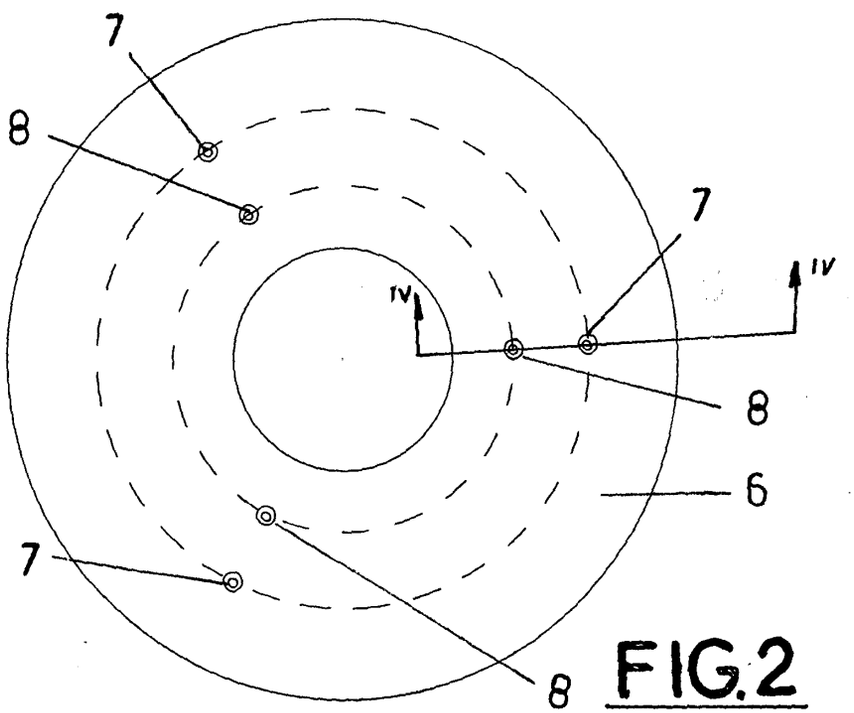

FIG.2

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Description

Object of the Invention

[0001] The invention herein refers to an induction diffuser for air conditioning installations, which contributes essential novel characteristics and substantial advantages in relation to the means known and used for the same purpose in the current stage of technical advancement.

[0002] Particularly, the invention proposes the development of an internal induction type of air diffuser, like those used as outlet devices fitted to ceilings of enclosed areas that are to be conditioned. This invention offers a considerable increase in the performance of the diffuser is achieved and notably simplifies its manufacture, due to the design characteristics that have been implemented on same. The diffuser is made in such a way that the effect of the induction, that takes place inside it, is carried out from the quantity of induced air that enters the inner space through a wide opening on the front plate. This effect is facilitated by the profile itself, that has been fitted to a section of the previously mentioned front plate.

[0003] The field of application of the invention is comprised within the industrial sector dedicated to the manufacture and/or installation of equipment and devices for air conditioning in general.

Background of the Invention

[0004] Experts in this field know that for many years, induction diffusers have been used in air conditioning installations to project the air into the enclosed area to be conditioned. These diffusers consist of devices that are made up of a plurality of conical elements, with diameters that successively get smaller towards the central axis of the device. These elements are situated in mutually concentric positions, maintaining separating distances between the successive conical elements and they are arranged in such a way that the separations between the cones make up diverging sections that lead towards the outside. Inside the diffuser opposite the outlet there is a cylindrical section so that it can be connected to the plenum, where the air is received at the lowest temperature transported by the corresponding duct. The effect of induction with a mixture of air from the outside is carried out in the external part of the diffuser, and is a consequence of the depression created by the previously mentioned divergent separation that exists between the successive adjacent conical elements.

[0005] The invention herein purports as its main objective, to develop a diffuser of the type mentioned in which, unlike the conventional diffusers, the induction is generated inside the device, which offers a series of advantages compared to traditional diffusers. These advantages mean that it is possible to work with much lower or much higher temperatures, depending on the time of the year, to reduce the flow and, as a result, thus reduce the size of the device. These objectives have been achieved with the induction diffuser and will be described below and the main characteristics are defined in the part corresponding to Claim 1.

[0006] In essence, the diffuser that has been invented comprises a main outer casing, that is principally in the form of a truncated cone. On the upper end there is a cylindrical projection, which is standard, so it can be connected to the plenum where the cold or hot air current is received from the corresponding duct. Inside this outer casing there are two sub-casings, principally in the form of truncated cone shapes. They are respectively concentric with each other and with the main casing. One of the sub-casings is closed at the top end and completely covers the other, and maintains a separating distance between them. This separating space is in fluid communication with the inside of the smaller sized sub-casing, due to the provision of a cylindrical neck on the smaller one. This unit is closed on the front by a circular plate, which has a diameter that is slightly smaller than the outer casing but larger than that of the internal sub-casings, whose front plate is used as a mount and support for both sub-casings, and in addition provides a central circular orifice through which the air penetrates from the outside environment, with a view to induction with the air supplied inside the diffuser.

Brief Description of the Drawings

[0007] These and other characteristics and advantages of the invention are clearly explained in the following in-depth description of the preferred realisation mode. It is provided only as an illustrative example and is not limiting, and refers to the drawings attached, where:

Figure 1 shows an elevation view, the cross-section of a quarter of the diffuser proposed by the invention;

Figure 2 shows a top view of the front plate of the diffuser invented;

Figure 3 shows an elevation view of the front plate seen in figure 2 and

Figure 4 illustrates an elevation view of a cross-section of the plate in Figure 2, cut through the line IV-IV.

Description of a Preferred Realisation Mode

[0008] As indicated above, the detailed description of the preferred realization mode of the invention will be defined below, helped by the diagrams attached. The same numerical references are used to refer to same or similar parts. In this respect, looking firstly to Figure 1, this is a side elevation view of the diffuser invented, re-

ferred to with the numerical reference 1 and the partial cross-section of a quarter. The aim is to be able to clearly distinguish the inner layout. The figure illustrates the diffuser in its functional position, i.e. fitted to a ceiling (11).

[0009] According to the constructive characteristics when it is made this way, the diffuser consists of an outer casing (2), made up of a truncated cone, which is standard. On the smaller base (top position) it has a cylindrical projection so that it can be adjusted to the plenum that receives the air current from the installation's duct pipe (not shown).

[0010] Inside this outer casing, there are two sub-casings, indicated by numbers (3) and (4) respectively, which in general terms are also in the form of truncated cones, and they are concentric with respect to the central axis of the outer casing. The first sub-casing (3), that occupies the intermediate position, is connected to the outer casing (2) using parts (5) at an angle that connect it to the said casing at its top closed base, while at the lower perimeter edge (or the large base of the truncated cone) it is joined to a front mount and support plate, helped by several long uprights (7), distributed at predefined positions along a circumferential line. This plate (6) is responsible for supporting the second sub-casing (4), open at the top and extended by a cylindrical neck (9), arranged concentrically with the others as mentioned, with the help of short uprights (8), that preferentially occupy positions opposite the previously mentioned long uprights (7).

[0011] With this layout, between both sub-casings there is a separation that determines a space that is in fluid connection with the inside of the afore-mentioned innermost casing (4) (through neck (9)) and also with the space determined by its separation with respect to the outer casing (2). The front plate (6) has an orifice (10) in an axially central position, that has a predefined diameter, facing the inner space of the smaller sub-casing (4).

[0012] In Figure 1 there are several arrows that indicate the direction of the air flow and how the induction takes place. In effect, arrow f_1 indicates the direction that the air follows from the plenum, in such a way that as it progresses towards the opening (12), which circles the perimeter of the plate (6), the depression created originates the intake of a volume of air, shown by arrow f_2, so that after passing through the innermost sub-casing (4), it continues its way through the space that exists between both sub-casings (3), (4), again towards the outlet (12). Thus, the induction effect is achieved inside the diffuser, with the advantageous consequences that have been mentioned above.

[0013] If we now look at Figures 2 and 3, these are top and elevation views respectively of the front plate (6), associated to the diffuser which, as seen in the top view, shows the uprights (7), (8), that are built-in on the plate. They emerge from radially facing positions and they are separated equal-angularly by angular distances of 120°. However, as understandable, this way to distribute the uprights is only illustrative, as any other suitable way is possible for the perfect development of the invention. The elevation view in Figure 3, shows a projection that enables us to see how the configuration of the front plate (6) has been designed. There is a substantial increase of the thickness as it progresses towards the inside of the plate. The cross-section view of the plate can be seen in greater detail in the cross-section shown in Figure 4, which has been taken from the line IV-IV on Figure 3. It has been designed in this way, not only for aesthetic reasons, but taking into account the functional aspects of the unit too.

[0014] It is not considered necessary to further extend the contents of this description for an expert in the matter to understand its scope and the advantages arising from the invention, as well as to develop and put into practice the object of the same.

[0015] Nevertheless, it should be understood that the invention has been described according to a preferred realisation of the same, therefore it is susceptible to modification without the need to alter the fundamentals of the invention. Such modifications may particularly affect the shape, size and/or materials used in the manufacture of the unit or its parts.

Claims

1. Induction diffuser for air conditioning installations, that is suitable to be anchored to the ceiling of an enclosed area and to project non-isothermal air at a lower temperature towards the inner space of this enclosed area. The diffuser has an outer casing which in general, is in the form of a truncated cone, that through its smaller base, positioned at the top, projects through a cylindrical section that is connected to the plenum from where the treated air is fed; characterized as it has two sub-casings (3,4) which are also in the form of truncated cones. However, they are different in size and situated at positions that are respectively concentric with each other and with the afore-mentioned outer casing (2) of the diffuser (1). One of the sub-casings (3), the larger of the two, is closed at its smaller base, positioned at the top, and joined from this to the outer casing (2) by angular parts (5). Along the edge of the perimeter of the larger base, positioned at the lower end, it is sustained to a front plate (6) by several long uprights (7) that are built-in on the plate and distributed equal-angularly. This front plate (6) represents a mount and support element for the smaller sub-casing (4) by means of short uprights (8) built-in on the plate, situated at positions radially opposite the long uprights (7). This sub-casing is designed so that along the smaller base it has a cylindrical neck and it is arranged in such a way that it maintains a predetermined separation distance from the sub-casing (3) that is situated at the inter-

mediate position. The front plate (6) has an orifice (10) that is axially centred and facing the larger base of the innermost sub-casing (4). The diameter of this orifice is smaller than that mentioned on the larger base of the afore-mentioned smaller sub-casing (4).

2. The diffuser, in accordance with claim 1, is characterised because the front plate (6) is designed in such a way that the thickness increases as it progresses towards the inside, according to a predefined profile.

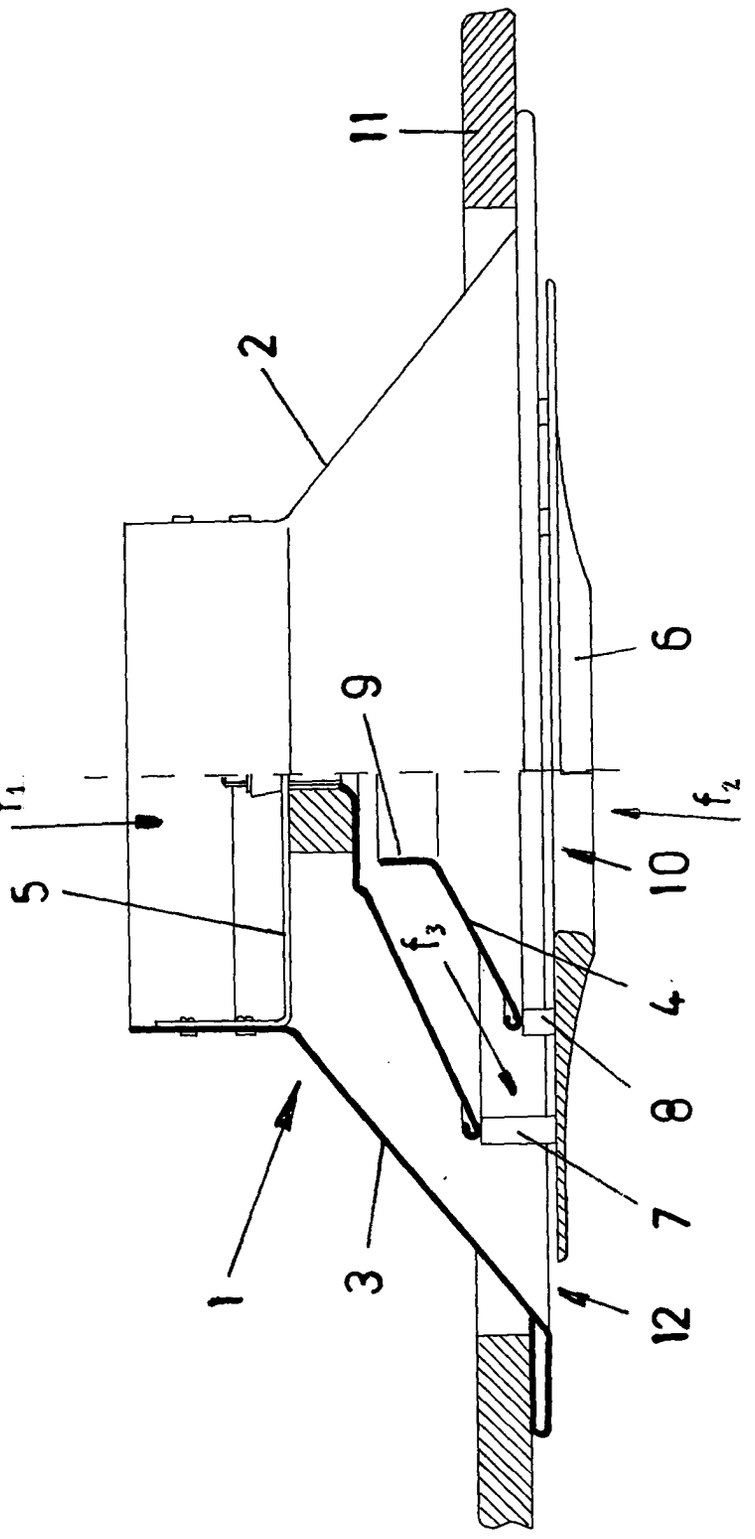

FIG.1

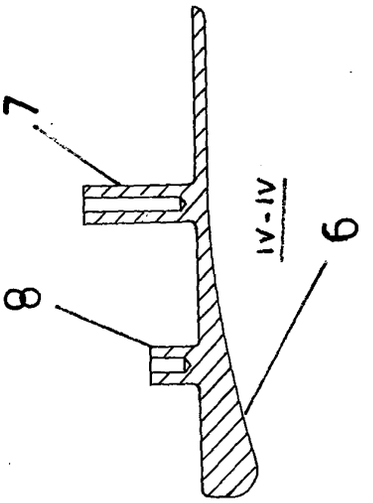

FIG.4

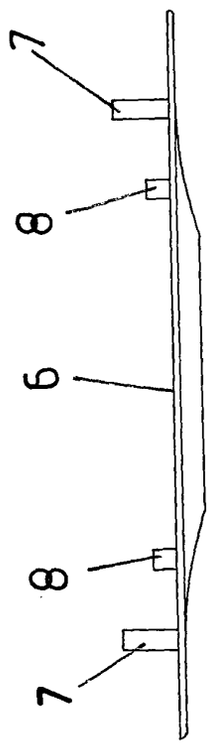

FIG.3

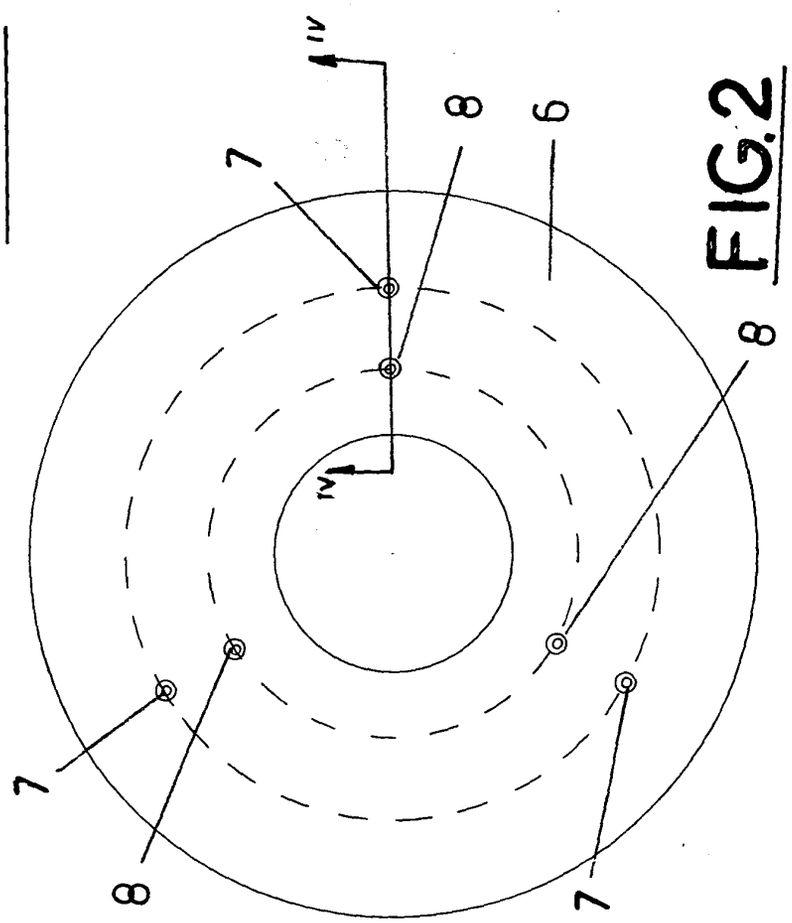

FIG.2