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(71) Applicant: **Rockwool International A/S**
2640 Hedehusene (DK)

(72) Inventor: **Vroomen, Johannes Petrus Cornelius**
5627, TD Eindhoven (NL)

(74) Representative: **Sundien, Thomas**
Zacco Denmark A/S
Hans Bekkevolds Allé 7
2900 Hellerup (DK)

(54) A building room

(57) Building room comprising a sound reducing structure reducing the transmission of sound from a first sub-room (7) of a room to a second sub-room (8) of a room, said room having a basic ceiling (3), a wall (14) and a floor (4), said sound reducing structure comprising a suspended ceiling (5) arranged below said basic ceiling (3) such that the basic ceiling (3) and said suspended ceiling (5) forms a space (6) between said basic ceiling (3) and said suspended ceiling (5), and said structure further comprising a partition wall (2) dividing said room into at least said first (7) and second sub-room (8), and extending from said floor (4) of said room to said suspended ceiling (5); and a silencer element (1) having sound reducing or sound absorbing properties, said silencer element (1) being arranged in said space (6) along and above said partition wall (2). To significantly and cost-effectively achieve a sound reduction in sound transferred from one room to another, the silencer element (1) is arranged so as to leave a gap between said silencer element (1) and said basic ceiling (3) or said suspended ceiling (5). The invention further relates to a method for installing a silencer element in a suspended ceiling.

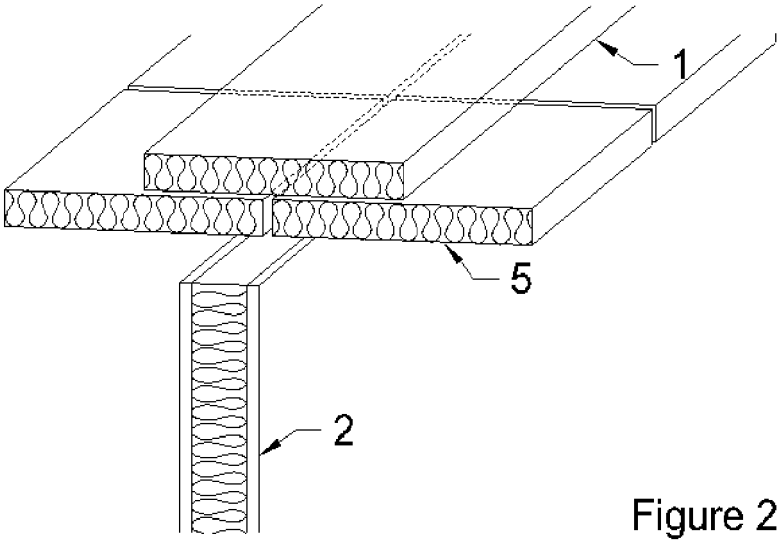

Figure 2

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Description

[0001] The present invention relates to the reduction of sound transferred in building rooms.

[0002] According to one aspect the invention relates to a building room comprising a sound reducing structure reducing the transmission of sound from a first sub-room of the building room to a second sub-room of the building room. The building room has a basic ceiling, a wall and a floor.

[0003] The sound reducing structure comprises a suspended ceiling arranged below the basic ceiling to form a space between the basic ceiling and the suspended ceiling.

[0004] The sound reducing structure further comprises a partition wall dividing the building room into the first and second sub-room, and extending from the floor of the building room to the suspended ceiling.

[0005] Further, the present invention relates to a method of installing silencer element in a building room comprising a basic ceiling and a suspended ceiling, said building room being divided in a first sub-room and a second sub-room by a partition wall.

[0006] The method is also applicable for retrofitting in existing installations.

[0007] Preferably, the suspended ceiling comprises a grid of profiles forming rectangular or substantially rectangular openings, wherein corresponding ceiling plates are arranged.

Background

[0008] Sound absorption is a process in which sound is converted into heat over time and distance. This can be achieved in several ways, wherein a common way is to add a layer of material such as mineral wool which could be both relatively heavy and soft.

[0009] Making a sound wave travel through different layers of material with different densities assists in sound reduction, which is why the silencer element advantageously may be made up from various materials with varying densities incl. interposed layers of metal or plastic film etc.

[0010] Users of office buildings, schools etc. strive to improve their working environment. One important factor is the level of sound transferred from one room to another room, which should be kept at a minimum.

[0011] Suspended ceilings with sound absorbing properties, and manufactured from fibrous materials, are well-known. Such ceilings are prepared for having optimal sound absorption properties in order to reduce the reverberation time in the room.

[0012] The known solutions often comprise ceiling plates having one layer of a fibrous material, e.g. mineral fibre, provided with a fleece layer and a layer of air permeable paint on the major surface facing the room. These ceiling plates are typically arranged in a supporting grid of profiles.

[0013] Ongoing research is carried out in order to discover economically feasible solutions further increasing the suspended ceilings ability to reduce the room to room transmission of sound. Suppliers offer suspended ceilings with different sound absorbing properties where the most efficient product typically is also the most expensive product. The above ongoing research is therefore also focused on providing cost-efficient ways of improving the sound absorbing properties of relatively low-cost installations of suspended ceilings.

[0014] Suspended ceilings are often used in large rooms divided into two or more smaller sub-rooms by means of partition walls. The suspended ceiling is typically installed first, and a space between the suspended ceiling and the basic ceiling is formed between the basic ceiling and the suspended ceiling. This space is sometimes known as "plenum", and is commonly used for technical installations such as ventilation, plumbing and cabling for electric power and computer network etc.

[0015] Following the installation of the suspended ceiling, typically the partition walls are installed. The partition walls will normally extend from the floor to the underside of the suspended ceiling. This construction has a very high degree of flexibility as partition walls may be arranged at any position of the building room, and further that such partition walls may be moved later, if a new division of the room is needed.

[0016] One problem with this type of construction is that sound penetrating the suspended ceiling above one sub-room of building room will propagate in the space between the suspended ceiling and the basic ceiling, and may to some extent penetrate into neighbouring parts of the room.

[0017] Ordinary acoustic ceiling plates for suspended ceilings, such as Rockfon plates comprising mineral wool, reduce room to room sound by approximately 18 dB. This is, however, not always satisfactory, and in case a better sound reduction is required, special ceiling plates may be used in the suspended ceiling, such as so-called wetfelt plates. Wetfelt plates are able to reduce the room to room sound by approximately 30 dB. Wetfelt plates are, however, expensive and further more laborious to install, as wetfelt plates are relatively heavy.

[0018] The prior art holds several solutions substantially eliminating this drawback of room to room sound of suspended ceilings, all of which basically teach firm division of the plenum or space above the partition walls; this solution is commonly known as "sound stop". The solution obviously reduces the sound transfer via the plenum from one room to another room. However this solution is very difficult to install, as the sound stop must be tailor made to the specific application and any technical installations passing above the partition wall or must be installed at these areas where there are not technical installations, such as heating or ventilation pipes, in the plenum.

[0019] The below two documents teach sound reduction via firm plenum division, i.e. the utilization of sound

stops.

[0020] JP 1 022 708 3 A2 describes a structure capable of isolating sound by installing a sound reducing divisional plate in a ceiling plenum immediately above a partition wall. The upper side of the divisional plate is installed in tight contact with the basic ceiling, and the lower side of the divisional plate is installed in tight contact with the upper side of the suspended ceiling. According to the disclosed construction, sound generated in adjacent rooms can be isolated.

[0021] NL 1 006 145 C2 describes a sound reducing structure to be installed in the plenum between a basic ceiling and a suspended ceiling. The structure is composed of several adjacent plate parts of even thickness, and the structure has a thickness in the region of 60 mm. The proposed material of the structure material is stone wool with a density in the vicinity of 110 kg/ m^3. Each plate part is on at least one side provided with a cover layer with closed structure, such as aluminium foil. On the other side to the cover layer is a fibreglass fleece. Finally, the proposed structure extends from the topside of the suspended ceiling to the underside of the basic ceiling. Fig. 9 shows this prior art sound stop type of sound reducing structure. By completely closing off between the two sub-rooms of the building room, high sound reducing effect is achieved. However, it is evident that it is difficult to have technical installations to pass the barrier above the partition wall, and further that it is not possible to easily retrofit such a construction to an existing room. Further it is evident that with this prior art construction, the partition wall cannot easily be moved to another position.

[0022] From the above two documents, it is clear that the transfer of sound from one room to another room, both of which is fitted with suspended ceiling, is accomplished by closing the plenum completely off more or less directly above the partition walls.

[0023] Further, the sound stops according to the prior art are typically not reusable, as each sound stop is custom made for the particular application.

[0024] EP 0 475 486 A1 describes a sound damping cover intended for placing over a light fixture arranged in a suspended ceiling construction in order to reduce the sound transmission there through. The cover consists at least substantially of mineral wool and has a form allowing it to rest on the suspended ceiling.

Brief description of the invention

[0025] It is an object of the present invention to present a solution which in an economically feasible and simple manner is able to reduce the level of sound transferred from one room to another room, all of which encompass suspended ceiling under a basic ceiling, and wherein the rooms are divided by partition walls.

[0026] It is also an object of the present invention to present a solution which reduces the level of sound transferred from one room to another room without obstructing the installation of technical installations, wherein all the rooms encompass suspended ceiling under a basic ceiling, and wherein the rooms are divided by partition walls.

[0027] A further object of the present invention is to present a solution which improves the sound reducing properties of a structure comprising a relatively cheap suspended ceiling, whereby the overall reduction of sound transferred from one room to another room is comparable with the reduction of sound presented by relatively expensive suspended ceilings.

[0028] It is an even further object of the present invention is to present a solution which reduces the level of sound transferred from one room to another room, where the solution involves with a minimum of preparation of the sound reducing means.

[0029] According to the invention, a silencer element, having sound reducing or sound absorbing properties, is arranged in the space along and above the partition wall, wherein the silencer element is arranged so as to leave a gap between the silencer element and the basic ceiling or the suspended ceiling. As it is not necessary to carefully fit the silencer element without a gap, installation is rendered very easy and cost effective.

[0030] According to an embodiment, said silencer element has a width extending in the plane or substantially in the plane of the suspended ceiling and a thickness extending perpendicular or substantially perpendicular to the suspended ceiling, said width being at least two times larger than said thickness. Hereby a substantial sound reducing effect can be achieved.

[0031] According to an embodiment, the suspended ceiling comprises a grid of profiles forming rectangular or substantially rectangular openings, wherein corresponding ceiling plates are arranged. Other shapes of the ceiling plates could be used, such as square or triangular, but rectangular plates are very versatile and easy to install.

[0032] The silencer element may be made from any suitable material, such as paper, natural fibres, saw dust etc., but according to an embodiment the silencer element is made from mineral fibres. Mineral fibres have the advantages inter alia of high fire resistance and resistance to decomposition.

[0033] The density of the silencer element may be chosen for the particular purpose and does not seem to significantly change the sound reducing effect of the silencer element. However according to an embodiment, the silencer element has a density in the range of 50 - 500 kg/m^3, preferably in the range 50 - 200 kg/m^3, and even more preferably in the range 50 - 175 kg/m^3. A density of e.g. 40 kg/m^3 might be usable, but a low density may entail difficulties with handling of the silencer element, as it may disintegrate during handling. On the other hand the price of the silencer element, and installation thereof, will normally rise with rising density, and it is found that a suitable compromise is to choose a density in the interval of 50 - 80 kg/m^3.

[0034] It is found that the position of the silencer ele-

ment in the plenum is not critical, but according to an embodiment the silencer element is arranged such that at least a part of said silencer element overlies said first sub-room of the room while another part of said silencer element at least borders said second sub-room of the room. Placing the silencer element like this will be advantageous as installation is very easy, also when retrofitting.

[0035] According to an embodiment the surface of the silencer element is open to air diffusion. This will normally provide the best sound absorbing effect of the silencer element, although a thin foil or film could be used.

[0036] The silencer element may, and will often, be placed directly on the suspended ceiling, but according to an embodiment, the silencer element is installed in any height above the upper surface of the suspended ceiling. This is an advantage if technical installations hinder or restrict placement of the silencer element directly on the suspended ceiling.

[0037] The width of the silencer element may be chosen for the particular application, and according to an embodiment, said silencer element has a width in the interval of 200 to 1,200 mm. A width of less than 200 mm will often not be enough for a significant reduction of sound. On the other hand increasing the width to more than 1,200 mm will often not be worth the extra cost in terms of more expensive silencer elements and more difficult installation. Normally a width of 600 mm or 1,200 mm will be chosen in Europe, as these widths are standard widths, and further will result in silencer elements, which are relatively easy to handle for a craftsman.

[0038] The thickness of the silencer element may be chosen for the particular application, and according to an embodiment the thickness of the silencer element is in the range of 10 - 600 mm. A thickness of less than 10 mm may have some effect, but normally not enough to be sufficient. Increasing the thickness will, on the other hand, increase the cost, and using a thickness of more than 600 mm will often not be worth the extra cost. A suitable compromise will often be a thickness in the interval of 200 to 400 mm.

[0039] Another aspect of the invention relates to a method as outlined above. The method comprises the steps of arranging a silencer element, having sound reducing or sound absorbing properties, in a space bound by the suspended ceiling and the basic ceiling, and dimensioning and arranging said silencer element so as to leave a gap between said silencer element and said basic ceiling or said suspended ceiling. This method is a very cost-effective way of installing a silencer element, and hence reducing sound from room to room.

[0040] As the silencer element does not need to fill the space, installation is very easy, and retrofitting to existing building rooms is also possible and indeed easy. Hence significant reduction of sound from room to room may be achieved at low cost by retrofitting the silencer element according to this simple method. This may significantly increase quality of life of people using such rooms, reduce stress and increase working capacity.

[0041] In an embodiment the method comprises the further step of arranging said silencer element such that at least a part of said silencer element overlies said first sub-room of the room while another part of said silencer element at least borders said second sub-room of the room. Hereby the silencer element can be easily arranged from one sub-room of the room. This can for example be done by lifting one or more ceiling plates in one sub-room of the room near the partition wall and shift the silencer element into the plenum and arranging the silencer element to overlie the second sub-room of the room.

[0042] The silencer element may be provided as a roll, and according to an embodiment, arranging said silencer element is effected by rolling the silencer element out in the space, substantially above the partition wall. This will provide a very easy installation procedure.

[0043] Comprehensive tests and analyzes have found that the above structure demonstrate clear and convincing effect in reducing the room to room transferred sound via the space above the suspended ceiling.

Description of the figures

[0044]

Figure 1 schematically illustrates a cross sectional view of a basic room encompassing suspended ceiling and a partition wall.

Figure 2 illustrates schematically and in a perspective view, an embodiment according to the invention.

Figure 3 schematically illustrates a cross sectional view of a basic room encompassing suspended ceiling and a partition wall.

Figure 4 illustrates a principal top view of one embodiment of the present invention.

Figure 5 illustrates a principal test setup.

Figures 6 - 8 show test results of the room to room silencing effect.

Figure 9 illustrates "sound stops" according to the prior art.

Detailed description of preferred embodiments with reference to the figures

[0045] Figures 1 and 2 show a building room divided into two parts or areas 7, 8 by a partition wall 2. The room is delimited by building walls 14, a basic ceiling 3 and a floor 4. A suspended ceiling 5 is mounted below the basic ceiling 3. The suspended ceiling 5 will normally comprise a grid or rail system (not shown) connected to the basic

ceiling 5. Loose ceiling plates (not shown) are connected to the grid as known per se.

[0046] The basic ceiling 3, the building walls 14 and the floor 4 may be made from any kind of conventional materials such as concrete incl. modules of prefabricated sections, bricks, timber or any other suitable building material.

[0047] As shown, a silencer element 1, having a thickness 11, and which exhibits sound absorbing properties, is arranged in a space 6 bounded by the lower surface of the basic ceiling 3 and the upper surface of the suspended ceiling 5, and in an area above the partition wall 2. As shown, a gap or space is left between the silencer element 1 and the basic ceiling 3. However the silencer element may be arranged so as to leave a gap between the silencer element and at least one of the basic ceiling and the suspended ceiling.

[0048] The silencer element 1 acts as a silencer, and when sound emanating from the first sub-room or area 7 pass the silencer element 1 in the aforementioned gap, a portion of the sound will be absorbed in the silencer element 1 by lateral absorption.

[0049] The silencer element 1 has sound reducing properties and alternatively or supplementary has sound absorbing properties.

[0050] The silencer element 1 may constitute a slab or a web of low density mineral fibre wool, and extends only partially in the height of the space 6.

[0051] As an alternative to mineral fibre wool, the silencer element 1 may consist of paper, bound sawdust or any other suitable material being able to make up a silencer element holding sound absorbing properties.

[0052] The silencer element 1 may be arranged directly or indirectly above any layer of additional material, e.g. insulation material, sound barriers or even vapour barriers etc. arranged directly or indirectly on the suspended ceiling.

[0053] The silencer element 1 may advantageously be installed as relatively long one-piece slabs originating from a roll of web 1; however using pre-cut slabs will prove equally efficient.

[0054] As the silencer element 1 functions as a silencer, the silencer element 1 does not need to be placed directly upon the suspended ceiling 5. In fact, the silencer element 1 may be installed at any height between the upper side of the suspended ceiling 5 and the lower side of the basic ceiling 3 in the vicinity of the partition wall 2. The silencer element 1 may even lie above or below technical installations 13 such as ducting 13 etc. as shown in figure 3. Consequently, at convenience, the silencer element 1 may be rolled out as a one-piece web on top of or below any hindrance located in the space 6.

[0055] As shown in figure 4, the silencer element 1 preferably has a length 10 extending in the plane or substantially in the plane of the suspended ceiling 5 and a thickness 11 perpendicular or substantially perpendicular to the plane of the suspended ceiling 5. The length 10 will normally be of approximately the same size as the partition wall, although a length 10 being for example 10% lower than the length of the partition wall is currently expected to give acceptable results. The width 9, substantially perpendicular to the partition wall 2, is preferably at least two times larger than said thickness 11 shown in figure 1.

[0056] The thickness 11 of the silencer element 1 is preferably in the range of 10 - 600 mm.

[0057] The silencer element 1 should preferably be open to air diffusion. This means that any applied paint or fleece etc. should also be open to air diffusion. If a non-permeable layer is applied, the layer should be relatively light and thin.

[0058] It will be possible to apply a facing e.g. in the form of a thin film to the silencer element 1. By doing so, handling and installation of the silencer element 1 is facilitated and further, the sturdiness of the silencer element 1 is increased. In some embodiments, e.g. where the silencer element 1 is in the form of a roll, it may be advantageously to arrange the "endless" silencer element 1 in a thin walled plastic bag. The silencing efficiency of packed/covered silencing elements has been tested and the results are stated the following section "test results".

[0059] As shown in figure 3, the silencer element 1' may be displaced slightly in relation to the partition wall 2. As shown, and as verified by the below test results, the silencer element 1' may be arranged with a substantial portion overlying only one sub-room of the room, and where the edge of the silencer element 1', opposite the overlying portion, may only border the other sub-room of the room. Further, the silencer element 1' may be arranged in any position where an edge of the silencer element 1', which is substantially parallel to the partition wall 2, is arranged in the vicinity of the partition wall 2.

[0060] Further and as schematically indicated in figures 3 and 5, the silencer element 1 may be arranged in any height 12 between the upper surface of the suspended ceiling 5 and the lower surface of the basic ceiling 3. The silencer element 1 may even be installed in varying heights meaning that the silencer element 1 in some areas may lie directly on the upper surface of the suspended ceiling 5, and in other areas lie on technical installations 13, i.e. ducting for ventilation etc. Further, the silencer element 1" may be attached to the underside of the basic sealing 3 by any suitable means of attachment. Conclusively, the silencer element 1 may at convenience be installed in any height 12 above the upper surface of the suspended ceiling 5, as the silencer element 1 serves as a sound absorbing silencer.

[0061] In the above it is understood that the partition wall extends from the floor of the room to the underside of the suspended ceiling. It should however be noted, that the present invention will prove equally beneficial in configurations wherein the suspended ceiling 5 abuts an upper portion of the sides of the partition wall 2, i.e. the upper edge of the partition wall 2 terminates in the space 6 between the basic ceiling 3 and the suspended ceiling

5.

[0062] Further, the silencer element 1 may be arranged such that at least a part of the silencer element 1 overlies the first sub-room 7 of the room while another part of the silencer element 1 at least borders the second sub-room 8 of the room.

[0063] From the teaching above, it is clear that the present invention is particularly suitable for building structures etc., however the subject matter of the present invention will prove equally efficient in other applications such as offshore structures or maritime vessels etc.

[0064] The relative level of sound absorbed by the silencer element 1 is by nature higher in structures comprising suspended ceiling with fairly high room to room transmission of sound and vice versa in structures comprising suspended ceiling with fairly low room to room transmission of sound. Hence a high degree of sound reducing effect can be achieved at low cost in existing buildings having fairly high room to room transmission of sound.

Test results

[0065] Comprehensive tests according to ISO 717-1 have been carried out. ISO 717-1 takes into consideration the different sound level spectra of various sound sources.

[0066] The silencing effect, which refers to the attenuation of sound passing into a room from the outside, such as room to room sound or sound from above ceiling surfaces, is represented in dB (DncW) according to the European standard EN 20140-9 and EN 150717/1.

[0067] In other words, DncW defines the average room to room silencing effect of a ceiling system. Of course this silencing effect will be influenced by the sound reducing effect of the ceiling plates used.

[0068] Figure 5 schematically indicates the silencer element in the space above the partition wall. In this specific example relatively high quality ceiling plates are use, wherein the ceiling plates produce a relatively high silencing. The silencing effect of the silencer element is measured with the silencer element arranged in three different heights:

1. The silencer element arranged directly on the upper surface of the suspended ceiling resulting a silencing effect of abt. 49.8 dB (DncW);
2. The silencer element arranged in a position between the lower surface of the basic ceiling and the upper surface of the suspended ceiling, wherein the silencer element is not in contact with any of said surfaces resulting in a silencing effect of 49.5 dB (DncW); and
3. The silencer element secured to the underside of the basic ceiling resulting in a silencing effect of 49.4 dB (DncW).

[0069] For all practical applications in normal buildings, a sound reducing effect of approximately 50 dB will be more than enough.

[0070] Conclusively, the height in which the silencer element is arranged in within the space is non-essential.

[0071] The graph of figure 6 shows the silencing efficiency of a silencer element with density of 80 kg/m^3 arranged with its centre substantially above the centre of the partition wall. In this particular example a standard ceiling plate is used. Such standard ceiling plates have a sound reducing effect of approximately 18 dB. Along the vertical axis, the silencing effect in DncW can be read as a function of the thickness of the silencer element along the horizontal axis. From the graph, it is clear that the silencing effect of the suspended ceiling without a silencer element according to the present invention results in a sound reduction of abt. 17 dB (DncW). By arranging a silencer element with a thickness of 60 mm, an overall silencing effect of abt. 23 dB (DncW) is achieved. As can be seen a sound reducing effect of approximately 30 dB can be achieved with a silencer element having a thickness of 300 mm, i.e. the same sound reducing effect as when using expensive wetfelt ceiling plates, as stated in the introduction. A sound reducing effect of approximately 30 dB will normally be enough to elliminate problems with sound from room to room in relatively quiet buildings like offices, hospitals etc. Comparing this with providing a silencer element of 600 mm, i.e. closing the entire space a silencing effect of 46 dB (DncW) is achieved. Conclusively, the effect of filling only 10% of the space with a silencer element, is an increase of silencing effect of abt. 6 dB (DncW), while filling the entire space results in an increase in the overall silencing effect of abt. 29 dB (DncW).

[0072] The graph of figure 7 shows the silencing efficiency of a silencer element at different positions in the space above the suspended ceiling, as with Fig. 5 using ceiling plates with high sound reducing effect. Along the vertical axis of the graph, the silencing effect in dB (DncW) can be read as a function of the position of the silencer element with respect to the partition wall.

[0073] Four different slabs or webs were tested:

1. 50kg/m^3, width 1,200 T200 (215 $\times$ 380 mm)
2. 50kg/m^3, width 1,200 T100 (115 $\times$ 180 mm)
3. 50kg/m^3, width 600 T200
4. 50kg/m^3, width 600 T100

[0074] Five tests were carried out, wherein all the tests were conducted with the sound generated in a first room:

1. The silencer element placed above a second room in such a way that no part of the web lies above the partition wall;
2. The silencer element partially lies above the partition wall with the major portion above the second room;
3. The silencer element centred above the partition wall;

4. The silencer element partially lies above the partition wall with the major portion above the first room;
5. The silencer element placed above a first room in such a way that no part of the silencer element lies above the partition wall.

[0075] Conclusively, tests number 1 & 5 resulting in silencing of the room to room transferred sound of abt. 51 dB (DncW), wherein tests number 2 & 4 results in abt. 5 % increase in sound reduction and test number 3 results in about 3.5 % increase in sound reduction.

[0076] The graph of figure 8 shows the room to room silencing effect as a function of the width of the silencer element. Again ceiling plates with high sound reducing effect of approximately 48 dB was used. The width of the silencer element is defined as the direction substantially perpendicular to the face of the partition wall. Three tests have been carried out with;

- a first setup without a silencer element;
- a second setup, where the width of the silencer element is 600 mm, with two different silencer elements in a first position centred above the partition wall and in second position arranged with the edge of the silencer element over the partition wall; and
- a third setup, where the width of the silencer element is 1,200 mm, with two different sin a first position centred above the partition wall and in second position arranged with the edge of the silencer element over the partition wall.

[0077] The samples tested were:

1. 50kg/m^3, T200, centred
2. 50kg/m^3, T100, centred
3. 50kg/m^3, T200, arranged with edge over partition wall
4. 50kg/m^3, T100, arranged with edge over partition wall

[0078] Conclusively, the width of the silencer element is of importance, however increasing the length from 600 mm to 1,200 mm show only limited improvement in silencing of the room to room transferred sound.
The skilled person will realize that a silencer element could be made up as a plurality of smaller elements installed adjacent to or on top of each other.

[0079] Further tests were carried out with a silencer element 1 arranged in a bag made of a polyethylene film having a thickness of 20μ. The film used had a calorific value of 48 MJ/kg and a density of 930-950 kg/m3, but as the film is very thin it does not compromise fire safety. The film had a surprisingly little influence on the effect of the silencer, so often it will be advantageous to include the film as handling of the silencer element is facilitated and any potential dust problems are eliminated.

Claims

1. A building room comprising a sound reducing structure reducing transmission of sound from a first sub-room (7) of a room to a second sub-room (8) of a room, said room having a basic ceiling (3), a wall (14) and a floor (4), said sound reducing structure comprising:

- a suspended ceiling (5) arranged below said basic ceiling (3) such that the basic ceiling (3) and said suspended ceiling (5) forms a space (6) between said basic ceiling (3) and said suspended ceiling (5);
- a partition wall (2) dividing said room into at least said first (7) and second sub-room (8), and extending from said floor (4) of said room to said suspended ceiling (5); and
- a silencer element (1) being arranged in said space (6) along and above said partition wall (2);

characterized in that said silencer element (1) is arranged so as to leave a gap between said silencer element (1) and said basic ceiling (3) and/or said suspended ceiling (5).

2. A building room according to claim 1, wherein said silencer element (1) has a width (9) extending substantially in the plane of the suspended ceiling (5) and a thickness (11) extending substantially perpendicular to the suspended ceiling (5), said width (9) being at least two times larger than said thickness (11).

3. A building room according to claim 1 or 2, wherein the suspended ceiling comprises a grid of profiles forming rectangular or substantially rectangular openings, wherein corresponding ceiling plates are arranged.

4. A building room according to any one of the previous claims, wherein the silencer element (1) is made from mineral fibres.

5. A building room according to claim 4, wherein the silencer element (1) has a density in the range of 50 - 500 kg/m^3, preferably in the range 50 - 200 kg/m^3, and even more preferably in the range 50 - 175 kg/m^3.

6. A building room according to any one of the previous claims, wherein said silencer element (1) is arranged such that at least a part of said silencer element (1) overlies said first sub-room (7) of the room while another part of said silencer element (1) at least borders said second sub-room (8) of the room.

7. A building room according to any one of the previous claims, wherein the surface of the silencer element

(1) is open to air diffusion.

8. A building room according to any one of the previous claims, wherein the silencer element (1) is installed in any height above the upper surface of the suspended ceiling (5).

9. A building room according to claim 2, wherein said silencer element (1) has a width in the interval of 200 to 1,200 mm.

10. A building room according to any one of the previous claims, wherein the thickness of the silencer element (1) is in the range of 10 - 600 mm.

11. A method of installing a silencer element in a building room comprising a basic ceiling (3) and a suspended ceiling (5), said building room being divided in a first sub-room (7) and a second sub-room (8) by a partition wall, **characterized in that** said method comprises the steps of:

arranging the silencer element (1), having sound reducing or sound absorbing properties, in a space (6) bound by the suspended ceiling (5) and the basic ceiling (3), and dimensioning and arranging said silencer element (1) so as to leave a gap between said silencer element (1) and said basic ceiling (3) or said suspended ceiling (5).

12. A method according to claim 11, comprising the further step of arranging said silencer element (1) such that at least a part of said silencer element (1) overlies said first sub-room (7) of the room while another part of said silencer element (1) at least borders said second sub-room (8) of the room.

13. A method according to claim 11 or 12, wherein arranging said silencer element (1) is effected by rolling the silencer element (1) out in the space (6), substantially above the partition wall (2).

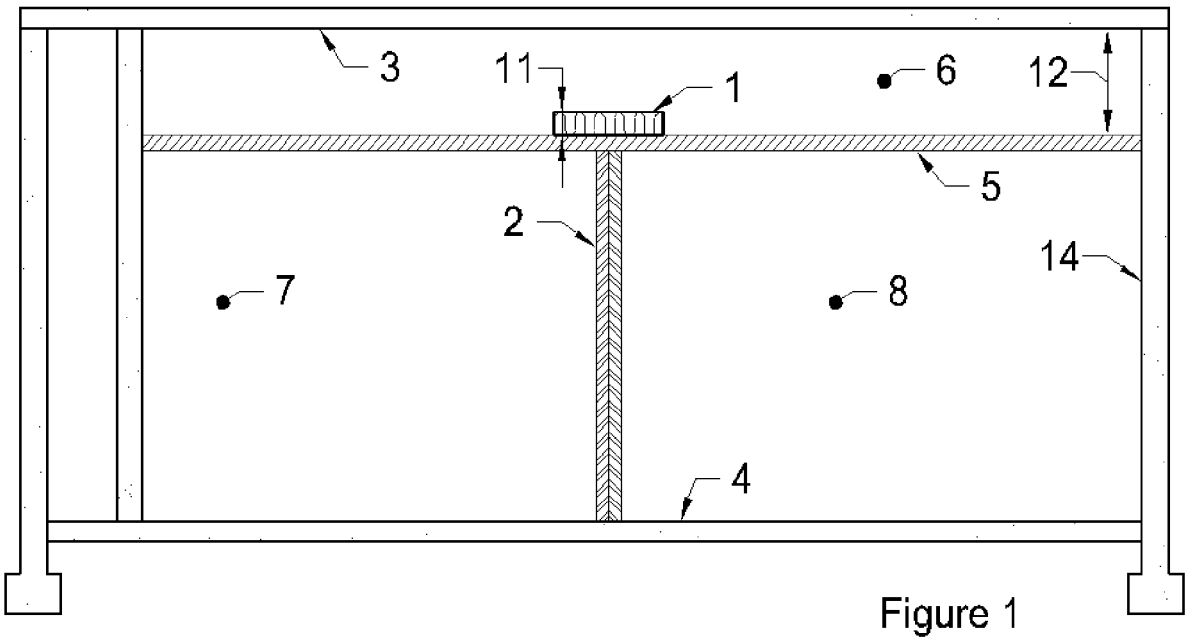

Figure 1

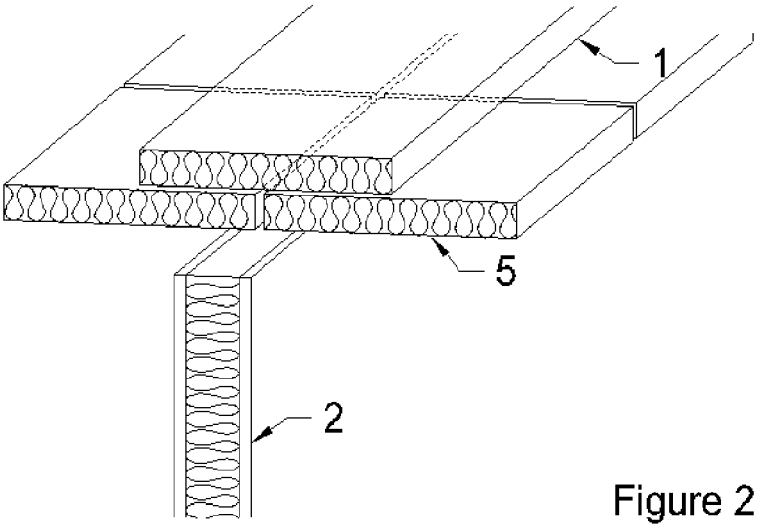

Figure 2

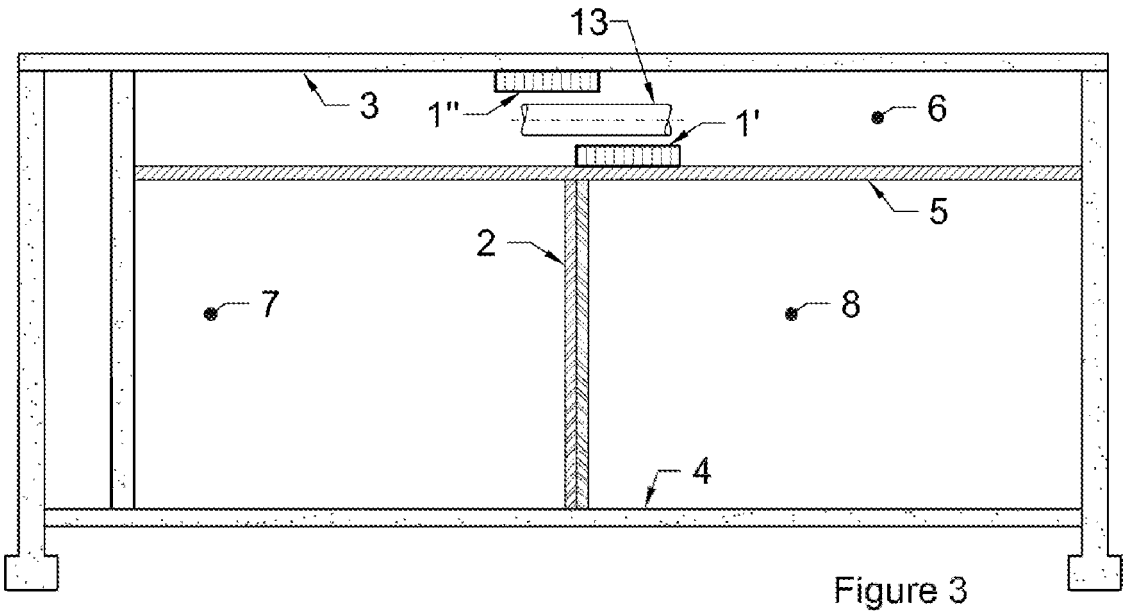

Figure 3

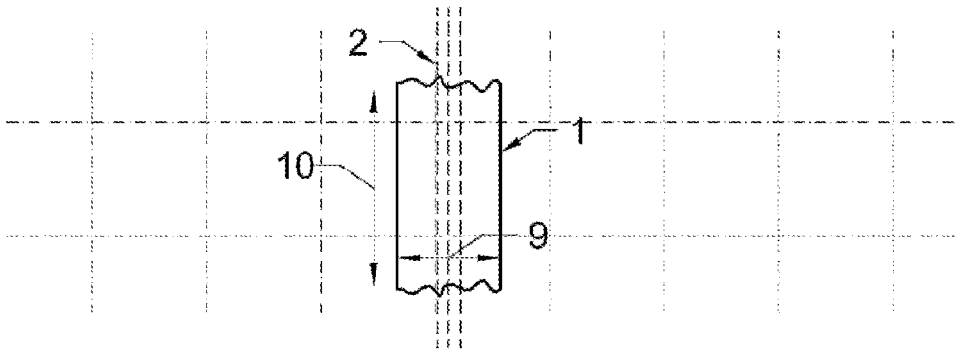

Figure 4

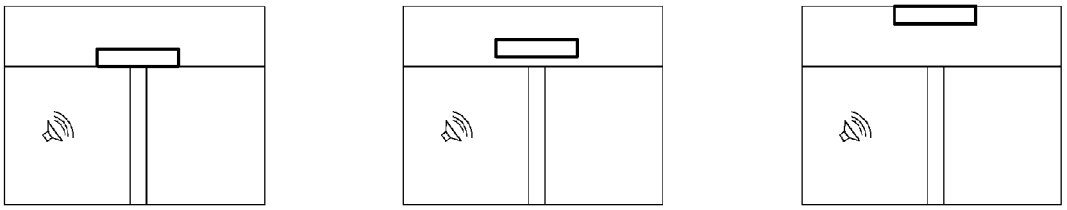

Figure 5

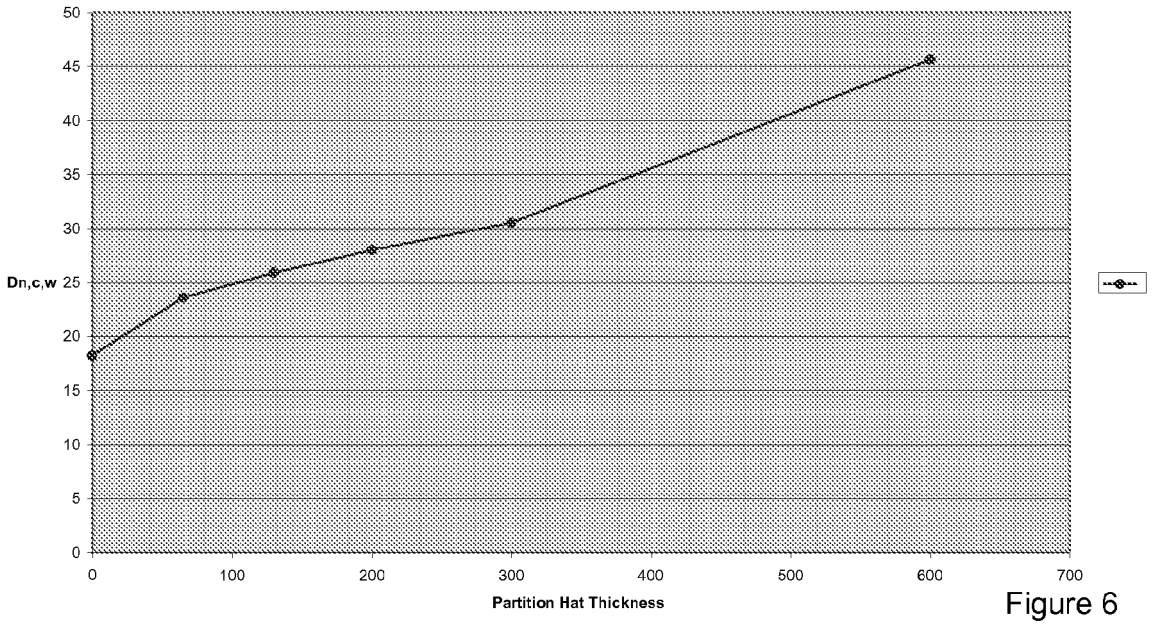

Figure 6

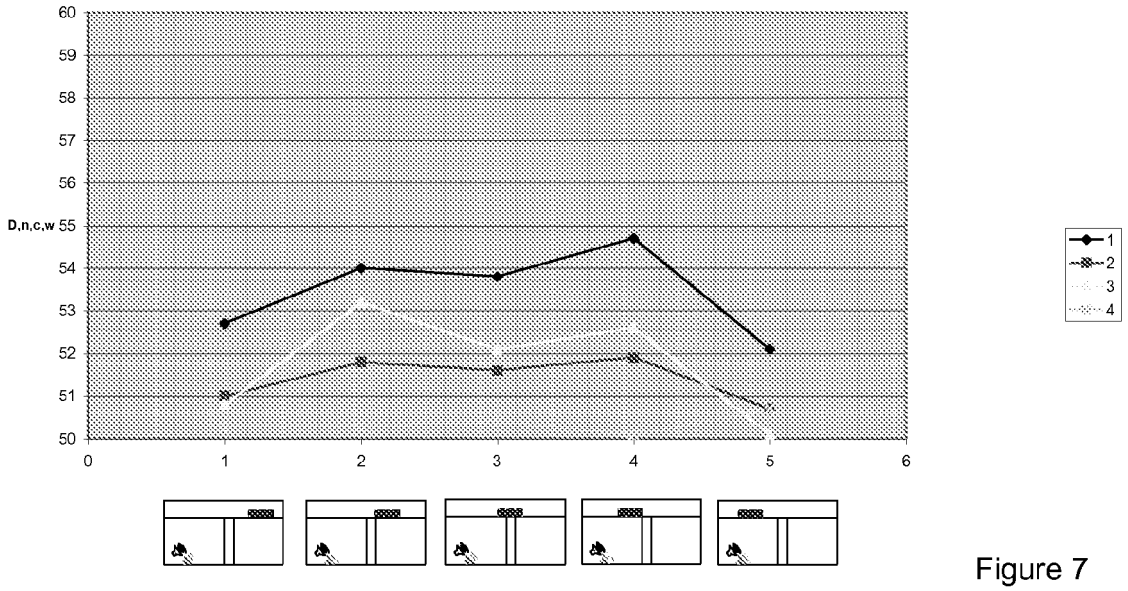

Figure 7

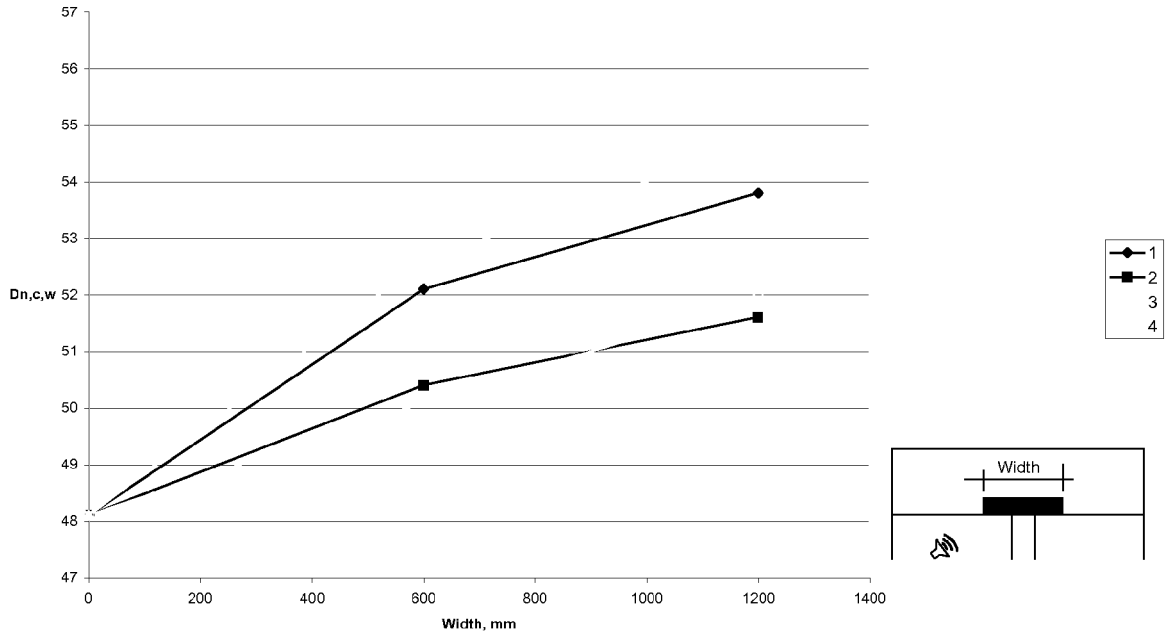

Figure 8

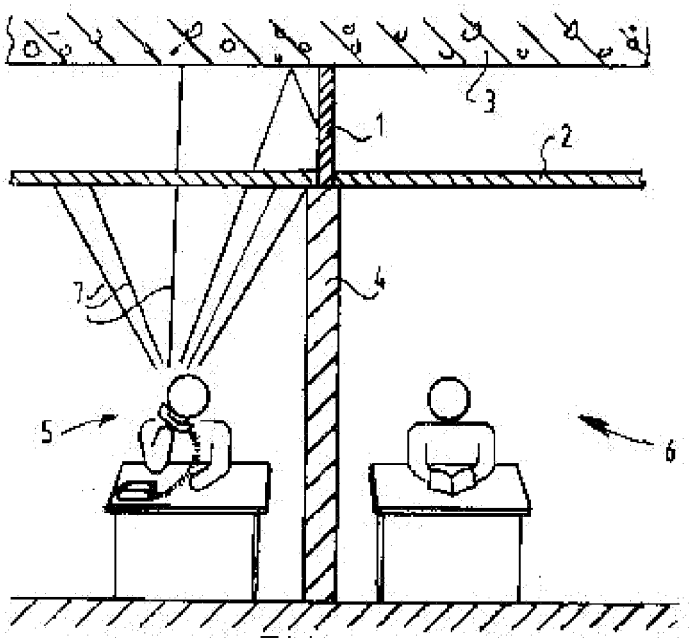

Figure 9

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 4779

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 August 2009	Demeester, Jan

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1

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