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(71) Applicant: **Wichmann, Antje Kirsten**
12163 Berlin (DE)

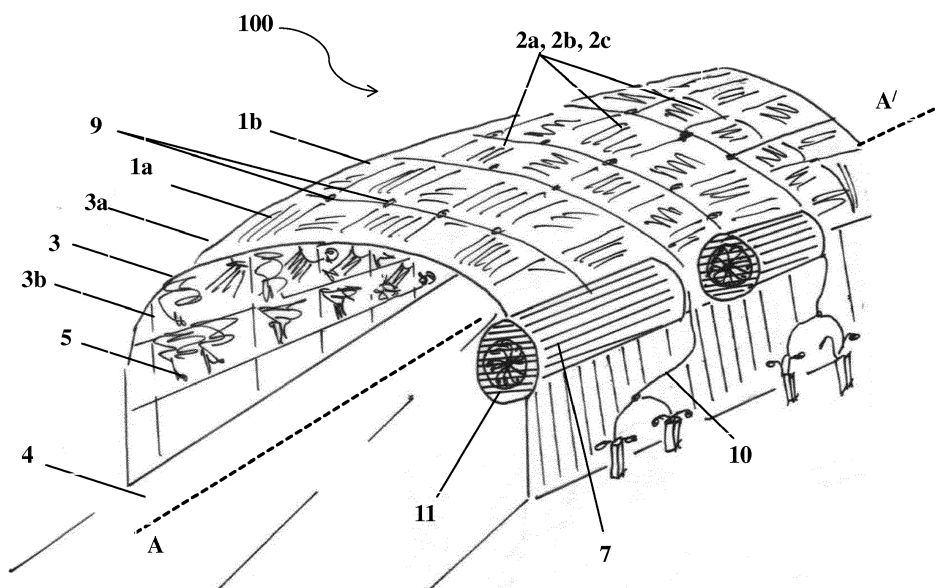
(72) Inventor: **Wichmann, Antje Kirsten**
12163 Berlin (DE)

(74) Representative: **Schulz Junghans**
Patentanwälte PartGmbH
Großbeerenstraße 71
10963 Berlin (DE)

(54) SHIELDING MODULE, SHIELDING SYSTEM AND VEHICLE TRANSPORTATION ASSEMBLY

(57) A shielding module (1) mountable overground, over a traffic drive-way (4) has an interior space that defines a passage (5) for vehicles to pass therethrough. The shielding module (1) includes a housing (3) having a shape that provides a concavity to its interior portion. The housing (3) has an outer surface (3a) adapted to directly face the atmosphere surrounding the module (1). An inner surface (3b) of the housing (3) extends essentially parallel and co-axial to the outer surface (3a), and defines and delimits an internal space that allows passage of vehicles through the interior portion of the module

(1). Further, a shielding system (100) allows passage of vehicles through its interior space, and includes multiple interconnected shielding modules (1), where the shielding modules (1) are positioned in series, abutting in longitudinal alignment. Each shielding module (1) of the shielding system (100) is mechanically connected to its adjacent modules through one or more connecting elements. Further, a vehicle transportation assembly (200) includes the driveway 4 and one or more shielding modules (1) or the shielding systems (100) mechanically connected to the driveway (4).

**Fig. 1**

Description

[0001] The invention is directed to a shielding module mountable overground, over a traffic drive-way, a shielding system for facilitating passage of vehicles through its interior space, comprising a plurality of interconnected shielding modules, and a vehicle transportation assembly comprising one or more of the shielding modules.

[0002] The constantly rising population and elevation of living standards in the metropolitan, semi-urbanized and urbanized cities is linked to the increase in demand and use of automotive vehicles as a means for both inter and intra-city transportation. Highways, intercity express/drive-ways, motorways, bridges and usual street roads all support traffic and interconnect cities/towns or different streets within such cities, and therefore, are a crucial element of every city's traffic/transportation network.

[0003] The traffic network of most of the metropolitan cities around the globe is rapidly increasing. Although public transportation network exists in most of the cities, which includes buses, trains and street trams, many people still prefer to drive their own vehicles/cars, for commuting from one place to another, especially for going to their offices, visiting friends, for going out to restaurants and for numerous similar purposes. Further, for inter-city routes, where motorways, drive-ways and highways connect one city to another, it may be at times more convenient, adventurous and cheaper to drive using one's own vehicle, instead of using inter-city trains. Traffic on such motorways is also thriving in many developed and developing economies, owed especially to, for example, goods-transportation trailers, SUVs, buses and cars being driven thereon during both day and night time.

[0004] Altogether, the demand and use of automotive vehicles as a means for public transport has reflected an incessant upsurge in the past decades, especially in metropolitan, semi-urbanized and urbanized cities of the world.

[0005] A crucial concern with the constantly proliferating number of vehicles on the streets, roads, and drive-ways/motorways, especially in megacities, is the noise pollution created by the traffic. Especially during the peak day hours, the noise pollution owed to traffic can be often annoying for pedestrians walking aside, and for people living in residential houses abutting or right-next to busy streets, roads, or highways. Albeit some houses are designed with outer walls and window panes formed of materials exhibiting high sound absorption characteristics, some noise still generally penetrates through the windows and ventilation ports provided in the residential accommodation. Especially during the night, such traffic noise can be at times even more irritating, and can cause distress for the people willing to sleep. The problem is even exacerbated on highways, wherein heavy-engine automotive vehicles, including trucks and trailers are constantly driven and create considerable noise.

[0006] Another critical concern is the level of increase

in air pollution caused by the traffic in the cities. Often the air in areas abutting busy streets and roads is deficient of fresh oxygen, and such contaminated air can be a huge health hazard.

[0007] Owed to such reasons, many people, particularly those in their old age, rather prefer to live in areas located either remote from the core of the cities, or areas within the cities generally not abutting busy streets or roads. In the real-estate sector, residential costs are often determined dependent on whether a house directly faces a busy street. Some people often hesitate and reconsider before deciding to purchase flats/accommodation right aside busy streets. The purchasing costs for houses are often seen to fluctuate and decline in areas directly facing cacophony of a city.

[0008] Therefore, many people often have to face a tradeoff when deciding to buy a residential property, between the advantages of living in the middle of a busy city and getting accustomed to the cacophony of the city, and the calm, peaceful ambience, free from noise and air pollution in the areas located remote from congested areas in a city center.

[0009] Some attempts have been made in the art to provide measures for mitigation of traffic noise on the streets/roads, attempting to reduce the disturbance caused to the residents living aside such streets. For example, some roads, highways or bridges are at times partially covered with open roofs. However, such structures only hover partially above the ground, generally acting only as a roof-covering for the drive-ways, and therefore, don't often substantially surround the road/drive-way. Therefore, sound waves still escape from sides as the vehicles pass through, and therefore, the level of noise-reduction achieved is only minimal.

[0010] Further, tunnels, especially those having dome-shaped roofs, as they run through underground areas, are hard to construct in many areas, due to financial budget constraints and often due to non-feasibility of excavation in some surface. Further, the outer surface of roof structures of such tunnels can hardly be leveraged for other auxiliary objectives.

[0011] Considering the problem mentioned above, and other shortcomings in the art, there exists a need for a construction for supporting the passage of traffic together with a minimization of influence to environment/surroundings.

[0012] The present disclosure provides a shielding system, acting as a traffic transportation infrastructure and formed through a longitudinal alignment of multiple shielding modules positioned overground, in a manner covering the traffic drive-way substantially, and defining an interior space for allowing passage of automotive vehicles. The shielding modules of the system substantially encompass the drive-way and reduce the transmission of noise from their interior to the surrounding space. Additionally, the outer surface of the shielding modules is designed and adapted to accommodate multiple solar panels/modules thereon, for harnessing solar energy,

which is eventually utilized for illuminating the interior of the modules.

[0013] According to an aspect, the current disclosure provides a shielding module mountable overground, over a traffic drive-way, in a manner substantially encompassing the drive-way. The interior space of the shielding modules defines a passage for the vehicles therethrough, specifically automotive vehicles. The module includes a housing that is designed in a shape providing a concavity to its interior portion. The housing includes an outer surface, adapted to directly face the atmosphere/open space surrounding the shielding module. An inner surface of the housing extends parallel to, and essentially co-axial to the outer surface. Further, the inner surface defines and delimits an internal space that allows passage of the vehicles through the interior of the module.

[0014] In one embodiment, the housing has a shape resembling a segment of a tubular or a cuboidal structure.

[0015] The shielding module exhibits design symmetry with respect to its longitudinal axis.

[0016] In one embodiment, the outer surface of the shielding module is provided with a mounting structure, adapted to receive at least one or more solar modules thereon.

[0017] In a further embodiment, on the outer surface of the shielding modules, the solar modules are positioned and secured using the mounting structure in a manner that they are directly exposed to the environment surrounding the modules. The solar modules are further adapted to receive and trap the sunlight for generation of solar energy.

[0018] In accordance with one aspect, the mounting structure for the solar modules includes a plurality of receptacles provided on the outer side of the housing. These receptacles are designed and dimensioned to receive the solar modules therein.

[0019] In a further embodiment, one or more illumination devices are positioned within the interior of the housing, which in one embodiment are electrically coupled to the solar modules and illuminate the interior space of the housing.

[0020] In accordance with another embodiment, the shielding modules include one or more ventilation ports for facilitating ventilation of air between the hollow interior portion of the modules and the surrounding environment.

[0021] According to another aspect, the shielding modules include one or more exhaust ports provided on the housing, and these ports are in fluid communication with the interior space of the shielding modules, for expulsion of exhaust gases emitted by the vehicles passing through the interior of the modules.

[0022] In yet another embodiment, shielding modules include at least one or more exhaust ports provided on the housing.

[0023] In one aspect, the inner surface of the housing is at least partially formed or coated with a material having a sound absorption coefficient between 0.5 and 1.

[0024] According to another aspect, the disclosure pro-

vides a shielding system for facilitating passage of vehicles through its interior space. The shielding system includes multiple interconnected shielding modules as described above, positioned in series and abutting each other in a longitudinal alignment. Each shielding module is mechanically secured and connected to its adjacent modules through one or more connecting elements.

[0025] That shielding system further includes an exhaust system in an embodiment, where at least one or more exhaust ports are provided on the shielding modules of the shielding modules.

[0026] In another embodiment, a display apparatus is positioned within the interior of the housing of the shielding modules. That apparatus renders perceivable information within the interior of the shielding modules.

[0027] According to yet another embodiment, the disclosure provides a vehicle transportation assembly including one or more shielding modules, or at least one or more shielding systems as mentioned above, and a traffic drive-way. The shielding modules or the shielding system are mechanically connected and secured to the drive-way, in a manner defining a hollow interior space that allows passage of the vehicles through the interior of the shielding system.

[0028] Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029]

Fig. 1 shows a perspective view of a shielding system, including multiple interconnected shielding modules, in accordance with an aspect of the present disclosure.

Fig. 2 depicts another perspective view of the shielding system (as viewed from the front) and a vehicle transportation assembly, in accordance with the present disclosure.

[0030] The following detailed description illustrates aspects of the disclosure and the ways it can be implemented. However, the description does not define or limit the invention, such definition or limitation being solely contained in the claims appended thereto. Although the best mode of carrying out the invention has been disclosed, those in the art would recognize that other embodiments for carrying out or practicing the invention are also possible. Further, for the purpose of maintaining uniformity in the disclosure, wherever possible, like elements, components, structures or modules are denoted by like numerals in the drawings and the following description.

[0031] The present disclosure aims to solve the aforementioned problems and provides an infrastructure for facilitating transportation of traffic over congested drive-

ways, roads, streets and inter/intra-city motorways, etc., which significantly eliminates noise and air pollution caused by the vehicles passing there-through. Therefore, occupants residing next to such busy roads/streets are expected to experience an upgraded living standard due to significant noise and air-pollution reduction in the ambience surrounding their houses.

[0032] The proposed infrastructure is formed of multiple shielding modules mountable directly over a driveway/road, and interconnected to each other in a manner creating an enclosure acting as a through-passage for vehicles. The modules are fixedly connected to each other in a preferably sealed manner, and include a housing formed of a material adapted to substantially mitigate noise transmission from the interior space of the infrastructure to the outer environment surrounding the infrastructure. A solar-energy generation apparatus is mounted over the outer surface of the infrastructure, for harnessing solar energy and creating electrical energy, which is eventually used for multiple purposes as explained in detail hereinafter. Further, exhaust gas ports are provided over the housing of the modules, which may be connected to an exhaust gas handling system. That system may store the exhaust gas emitted by the vehicles passing through the shielding modules, and filter those exhaust gases for the purpose of reducing the hazardous pollutants emitted and expelled into the atmosphere.

[0033] The term 'vehicle' as used in the disclosure, may refer to, though not being strictly limited to, all means of transportation, such as automotive vehicles, particularly including cars, motorbikes, trucks, trailers, Sports Utility vehicles (SUVs), wagons, scooters, bicycles, and so forth. In certain embodiments, the disclosed infrastructure is also mountable over train tracks.

[0034] Fig. 1 depicts a perspective view of a shielding system 100 mounted over a drive-way 4, in accordance with an embodiment of the current disclosure. The shielding system 100 includes multiple shielding modules 1a, 1b, and so forth, mechanically connected to each other, and longitudinally aligning in a manner abutting and juxtapositioned with respect to each other. Though only two shielding modules 1a and 1b are shown being marked, as can be seen, numerous such modules 1 are mechanically connected to define the entire shielding system 100.

[0035] Each shielding module 1 includes a housing 3, having an inner surface 3b that defines and delimits an internal space for passage of vehicles through the shielding system 100. Further, an outer surface 3a of the housing 3 directly interfaces the atmosphere surrounding the shielding modules 1, in a mounted state of the shielding system 100 over the drive way 4.

[0036] Each shielding module 1 of the system 100 has a hollow interior structure, defining a passage 5 for transportation of vehicles through the interior of the system.

[0037] Axis A-A' represents the longitudinal axis for the shielding modules 1. As the shielding modules 1 extend longitudinally aligned to each other, that axis also defines

the longitudinal axis for the entire shielding system 100. Preferably, with respect to the longitudinal axis AA', the inner surface 3b and the outer surface 3a of the housing 3 are positioned coaxially and extend essentially parallel to each other along the longitudinal direction. Therefore, design symmetry is realized for each shielding module 1, with respect to the longitudinal axis AA'.

[0038] In the shown embodiment, the housing 3 has a curved, dome-shaped structure, resembling a section of a tube. Effectively, the shape resembles a tube with an excised bottom portion, i.e., a segment of a tubular structure. That shape provides a concavity to the interior portion of the housing 3. More specifically, when viewed from outside, the shape of the housing 3 can be envisioned convex, protruding outwards from its longitudinal axis A-A'. For a viewer within the interior space of the housing 3, the housing has a concave interior surface 3b, bulging outwards.

[0039] Other suitable shapes for the housing 3 may also be contemplated. For example, in some embodiments, the housing 3 may also have, for example, a cuboidal structure with an open bottom portion and a hollow interior. In other cases, the housing may also have an irregular shape, having a variable radius of curvature at different points on its outer surface.

[0040] The inner surface of the housing 3 is at least partially made of a material capable of absorbing the incident sound waves significantly. Specifically, the material preferably has a sound absorption coefficient lying within a range of 0.5 to 1. More preferably, the material may have a sound absorption coefficient lying between 0.75 and 1.

[0041] In preferred embodiments, the basic structure of the housing may be formed of a metal or metallic alloy construction, such as steel, aluminium or any other suitable metallic material. Further, in combination, a coating of a material such as spun fiber, glass fiber, plexiglass, or any other plastic/transparent material having high sound absorption coefficient may be provided over the basic metallic structure. In other alternative embodiments, resonating materials having holes or openings may also be provided over the interior surface of the housing, for facilitating significant sound absorption.

[0042] In some embodiment, the inner surface 3b may also be designed to have a hybrid material coating, such as a combination of a porous absorber and a non-porous panel absorber.

[0043] The outer surface 3a of the housing 3 is designed to have multiple receptacles or cavities thereon. Such cavities are designed to receive numerous solar panels, such as those shown by numerals 2a, 2b, 2c, therein. Therefore, such cavities have a surface profile that matches the surface profile of the solar panels 2, to facilitate accommodation of the panels 2. Since the outer surface 3a of the housing 3 directly interfaces the environment surrounding the shielding system 100, the solar panels 2 continuously receive trap sun rays and therefore, convert the solar energy into electrical power. Fur-

ther, any of the suitable fixture or mechanical connection means known in the art, such as nuts and bolt assemblies, clamping means and fittings, may be used to fix the solar panels/modules 2 to the outer surface 3b of the housing.

[0044] Other suitable solar panel mounts known to the art may also be used for mounting the panels 2 over the outer surface 3b of the housing, such as metallic roof bases, L-feet structures attached to the outer surface using screwing mechanisms, mounting rails having a top surface for accommodating solar panels, etc.

[0045] In one embodiment, the solar panels 2 may be Transparent Luminescent Solar Concentrator modules (TLSC), Building-integrated Photovoltaic (BIPV) modules, Glass solar-panels, thin-layer modules composed of amorphous solar cells, etc. In other alternative embodiments, thin-film Copper indium gallium selenide PV modules (CIGS-PV modules) may also be used. CIGS PV panels have a material formed as a solid solution of copper indium selenide (CIS) and copper gallium selenide (CGS), with their general chemical formula being $\text{CuIn}_x\text{-Ga}_{(1-x)}\text{Se}_2$. The bandgap value of the semiconductor value varies with x, from 1 to about 1.7 eV. Other alternative types of solar panels known in the art that are made of other materials may also be used, such as mono-

or polycrystalline silicon panels, amorphous silicon or Cadmium Telluride Panels, etc.

[0046] Optionally, a mechanism may be connected to the solar panels, to change their orientation during the day, based on the inclination of sunlight, with the objective of increasing the efficiency of the system, i.e., the amount of solar energy trapped by the modules. Such a mechanism may be, for example, a pivotal connection of a pneumatic mechanism to the bottom surface of the solar panels. Movement along one or more degree of freedom at the pivotal connections can be achieved by using pneumatic actuators connected to the solar panels using cantilever beams.

[0047] Mounted over and covering a substantial portion of the outer surface 3b of the housing 3, the solar panels constitute an integrated solar energy harnessing apparatus. The electric energy generated by the apparatus is intended to be used for multiple purposes, which would be explained in detail hereinafter.

[0048] The shielding system 100 includes a number of exhaust ports in the form of ducts or conduits 7, as shown being provided on the top edges of the housing 3. These ducts 7 directly communicate with the interior space of the housing 3. Preferably, the ducts 7 may each have an exhaust fan 11, for sucking the exhaust gases from the housing 3's interior, by creating negative pressure inside the interior the ducts. One end of the exhaust ducts 7 is further connected one or more exhaust pipes 10.

[0049] Though the exhaust ducts 7 shown here have a tubular structure, and two of such ducts 7 each are shown located on the top right and the top left corners of the shielding system 100, the number, shape and form of the ducts 7 may vary depending on factors such as

the size of the shielding modules 1 forming the entire shielding system 100, and the rate at which exhaust gases are emitted on an average by the traffic driven through the shielding system 100. In some embodiments, simple holes or chimneys may also be provided, acting as the exhaust ports for the shielding system.

[0050] The shielding system 100 is, therefore, capable of reducing the air pollution caused by the vehicles driven through its interior.

[0051] Multiple ventilation ports 9 are further provided over the outer surface 3b of the housing 3. These ventilation ports may be through-holes or openings leading into the housing 3's interior, and enable ventilation of air between the interior and exterior of the shielding system. However, the number of such ventilation ports is kept at a minimum, to minimize the number of exit points for the sound waves within the interior of the housing 3.

[0052] The electrical power generated by the solar panels 2 is utilized for running the suction fans 11 of the exhaust ducts 7. In this manner, no additional, external source of power is required, especially when enough electrical energy has been generated.

[0053] The electric components of the solar energy harnessing apparatus, formed of a series/parallel connection of the solar panels 2, further includes one or more batteries connected to the solar panels 2, and at least a control unit. That circuitry is electrically coupled to the exhaust system for the shielding modules 1 through suitable electrical connections, including electrical wires or cables. The energy stored within the batteries of the solar energy harnessing apparatus, therefore, may be used for driving the exhaust fans 11 of the ducts 7.

[0054] The electrical energy generated by the solar panels 2 may be further utilized for other purposes in certain embodiments, such as for lighting the street lamps in the vicinity of the shielding system 100, or for operating the traffic signals.

[0055] Additionally, illumination devices (not shown) are provided within the interior of the housing 3b. Mounted over the interior surface 3b, such illumination devices act as a source of light and illuminate the interior of the shielding system 100. The devices may be, for example, fluorescent light bulbs, lamps, LEDs, etc. Further, the illumination devices are also coupled to the solar panels 2 through suitable circuitry of electrical wires, to extract electrical power from the solar modules, for their operation. The number of such illumination devices may depend at least on their operating power, and the capacity of the solar energy harnessing apparatus of the shielding system 100, which is dependent at least on the average electrical energy generation rate for each solar panel 2, and the no. of such panels being deployed.

[0056] Fig. 2 shows another perspective view of the shielding system 100, as seen from the front. The interior wall of the housing 3, i.e., the interior surface 3b, is further provided with a display apparatus, which includes multiple display screens 12 mounted on the interior wall. The display screens 12 render or display perceivable infor-

mation. Such perceivable information, images or motion pictures, can be, for example, a virtual reality based display of a natural scene provided on the display screens 12, to enable drivers of the vehicles to have a virtual feel of driving in a natural environment. In preferred embodiments, the screen 12 may be in the form of a thin transparent plastic foil or layer, which is illuminated by an appropriate light source from behind, such as an LED. That material combination renders a 3D-effect on the screen 12. Specifically, dynamic images of the trees and plants may be displayed on the screens 12, in one embodiment.

[0057] Alternatively, in some embodiment, the display screens 12 on the interior wall 3b of the housing 3 may also be used for other commercial purposes, such as dynamic or static advertising display of products and services of interest for people, or also for providing information of relevance to the drivers, such as traffic information, speed-limit, and so forth.

[0058] The display screens 12 may each be an Electroluminescent display (ELD), Liquid Crystal Display (LCD), a Plasma Display Panel (PDP), Organic Light-emitting Diode Display (OLED), CRT Display, or may also use any other conventional display technology/apparatus known in the art.

[0059] The structure, form and shape of the shielding modules 1, along their longitudinal direction, is generally designed to match the curvature of the drive-way 4, to enable mounting of the shielding system 100 in a manner extending substantially parallel to the driveway 4. For curvilinear roads, for example, the tubular structure of each shielding module 1 may be designed to be bent in a shape to match the driveway's curvature/profile along its length. Further, though the shielding modules 1 are most suitable to be mounted over flat driveways and roads, in cases where the profile of the surface of the driveway 4 has uphill and downhill variations, the surface profile of the lowermost surface of each shielding module 1, to be positioned in vicinity to the ground, may also be designed to be variable and correspond to such upslope or downslopes on the ground surface.

[0060] Suitable means, structural elements, mechanical connection or fastening elements known in the art may be used for mounting the shielding system 100 over the driveway 4. For example, in one embodiment, the bottom portions of the housing 3 for each shielding module 1 may have multiple flat-structured side plate or bracket (not shown) integrally attached thereto. Such side plates may engage with structural, support beams positioned equidistantly directly over surfaces located aside the drive way 4. The side plates may be provided with through-holes or apertures at multiple portions, which may be provided to align with corresponding holes provided on a top plate of each support beam. Screwing means, such as nuts and bolt assemblies may then be used to engage the side plates of the housing to the top plates of the support beams, therefore, mounting the shielding modules immovably and rigidly over the driveway 4. The side plates may also be directly welded to

the support beams at multiple surfaces.

[0061] In general, load bearing materials of any other form or shape may also be provided at lower portions of the housing 3, which may structurally engage with support beams positioned aside the driveway 4, for mounting and connecting the shielding modules 1 to the driveway 4.

[0062] Indicated by numeral 200 in Fig. 2 is a vehicle transportation assembly, in accordance with the present disclosure. That assembly 200 includes one or more shielding systems 100, or one or more shielding modules 1 (shown in Fig. 1) of the shielding system 100, mechanically connected to the driveway 4 in the manner as explained above. Further, the shielding modules 1 are interconnected in series, in a longitudinal direction, defining a hollow interior space for the passage of vehicles. The mechanical connection between the shielding modules 1 can be achieved by any of the appropriate mechanical connection mechanisms known to the art, such as nut-bolt assemblies or clamping assemblies. For example, for every pair of abutting shielding modules 1, one shielding module may be provided with receptacles, cavities or apertures on different portions of its housing, and the other module may be provided with screw elements for engaging such apertures or cavities. Bolt assemblies can then be used to fasten the adjacent modules together.

[0063] Although the current invention has been described comprehensively, in considerable details to cover the possible aspects and embodiments, those skilled in the art would recognize that other versions of the invention are also possible. Further, the illustrated embodiments of the invention, though exemplary, are not intended to define or limit the scope of the invention, such spirit and scope being completely contained within the claimed appended hereto.

List of Reference Numerals:

[0064]

100	Shielding System
1, 1a, 1b	Shielding Modules
2	Solar Panels
3	Housing
3a	Outer Surface (Housing)
3b	Inner Surface (Housing)
4	Driveway
A-A'	Longitudinal Axis for Shielding System
5	Interior Passage for vehicles
7	Exhaust Ports/Ducts
9	Ventilation Ports
10	Exhaust Pipes
11	Exhaust Fans
12	Display Apparatus/Screens
200	Vehicle Transportation Assembly

Claims

1. A shielding module (1) mountable overground, over a traffic drive-way (4), and having an interior space defining a passage (5) for vehicles therethrough, specifically automotive vehicles, the shielding module (1) comprising:
 - a housing (3) having a shape providing a concavity to the interior portion (3b) of the housing, the housing including:
 - an outer surface (3a) adapted to directly face the atmosphere surrounding the module; and
 - an inner surface (3b) extending essentially parallel, in particular co-axial to the outer surface (3a), wherein the inner surface (3b) defines and delimits an internal space that allows passage of the vehicles through the interior of the module (1).
2. The shielding module (1) of claim 1, wherein the housing (3) has a shape resembling a segment of a tubular or a cuboidal structure.
3. The shielding module (1) as claimed in one of the preceding claims, exhibiting design symmetry with respect to the longitudinal axis thereof.
4. The shielding module (1) as claimed in one of the preceding claims, wherein the outer surface (3a) of the housing (3) is provided with a mounting structure adapted to receive at least one or more solar modules (2) thereon.
5. The shielding module (1) of claim 4, wherein the shielding module (1) comprises a plurality of solar modules (2) on its outer surface (3a), the solar modules (2) are positioned and secured using the mounting structure in a manner directly exposed to the environment surrounding the module (1), the solar modules (2) being adapted to receive and trap sunlight for generation of solar energy.
6. The shielding module (1) of one of the claims 4 or 5, wherein the mounting structure includes a plurality of receptacles provided on the outer side of the housing (3), the receptacles being designed and dimensioned to receive the solar modules (2) therein.
7. The shielding module (1) of one of the preceding claims, further comprising at least one or more illumination devices positioned within the interior of the housing (3), the illumination devices being configured to illuminate the interior space of the housing (3) and being preferably electrically coupled to the solar modules (2).
8. The shielding module (1) in accordance with one of the preceding claims, further comprising one or more ventilation ports (9) adapted to facilitate ventilation of air between the hollow interior portion of the module (1) and the surrounding environment.
9. The shielding module (1) of one of the preceding claims, and including one or more exhaust ports (7) provided on the housing, the exhaust ports (7) being in fluid communication with the interior space, for expulsion of exhaust gases emitted by the vehicles passing through the interior of the module (1).
10. The shielding module (1) in accordance with one of the preceding claims, wherein the inner surface (3b) of the housing (3) is at least partially formed or coated with of a material having a sound absorption coefficient between 0.5 and 1.
11. A shielding system (100) for facilitating passage of vehicles through its interior space, comprising a plurality of interconnected shielding modules (1) in accordance with one of the preceding claims, the shielding modules (1) being position in series, abutting in longitudinal alignment, and each shielding module (1) being mechanically connected to its adjacent module through at least one connecting element.
12. The shielding system (100) of claim 11, further comprising an exhaust system, having at least one or more exhaust ports (7) provided on the shielding modules (1) of the shielding system (100).
13. The shielding system (100) of one of the preceding claims 11 or 12, further comprising a display apparatus (12) positioned within the interior of the housing (3) and configured to render optically perceivable information within the interior of the shielding modules (1).
14. A vehicle transportation assembly (200) comprising at least one or more shielding modules (1) of one of the claims 1 to 10, or at least one shielding system (100) of one of the claims 11 to 13, the transportation assembly (200) further comprising a traffic drive-way (4) and the shielding modules (1) or the shielding system (100) being mechanically secured to the drive-way (4), such that the shielding modules (1) or the shielding system (100) form a hollow interior space for allowing passage of the traffic there-through.

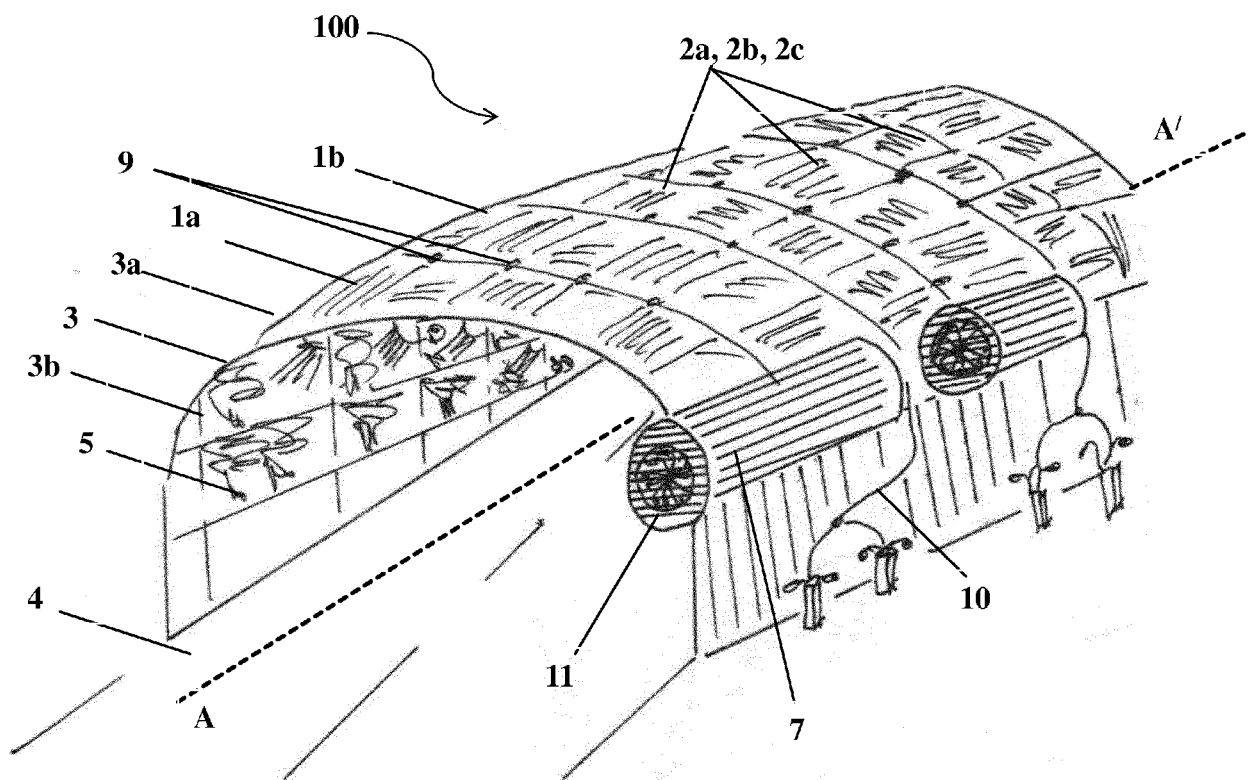


Fig. 1

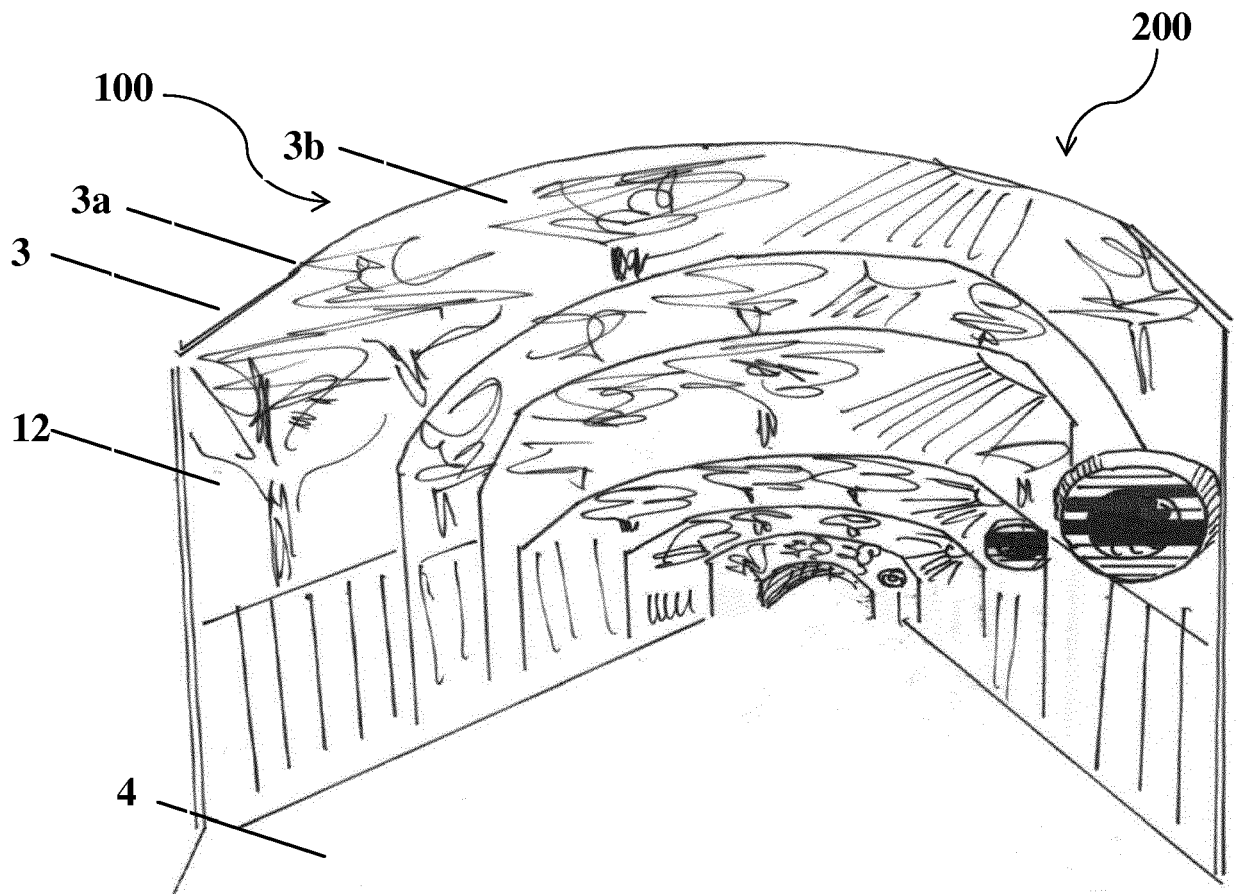


Fig. 2



EUROPEAN SEARCH REPORT

Application Number
EP 17 20 4205

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	EP 0 567 040 A1 (WITTING GERHARD [DE]) 27 October 1993 (1993-10-27) * column 10, line 41 - column 11, line 9 * * column 13, line 54 - column 14, line 34 * * column 15, lines 27-32; figures 1,2,13,14 *	1-9, 11-14 10	INV. E01F8/00
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			TECHNICAL FIELDS SEARCHED (IPC)
			E01F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 April 2018	Examiner Stern, Claudio
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