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(54) Tower assembly

(57) The invention relates to a tower assembly for mounting security, safety or communications equipment, the tower assembly comprising a plurality of towers, each tower comprising a base and a column, and a carrier unit configured to retain the plurality of towers in their stowed position and from which at least a first base and a first column is removable and at least a second column is mountable upon the carrier unit in the deployed position of the assembly. The invention also relates to a method of erecting a tower assembly.

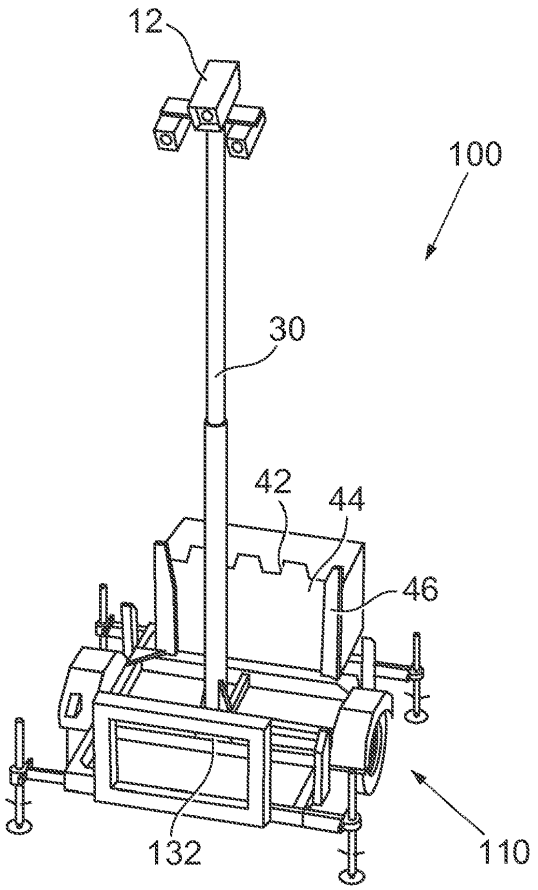

Fig. 2

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Description

[0001] The present invention relates to an equipment mounting tower assembly, in particular a tower assembly suitable for mounting security, safety or communications equipment.

[0002] Typical security, safety or communications devices which may be used in a private or commercial context include cameras (for example CCTV), lighting, motion detectors, speakers, alarms, antennas, microphones, parabolic dishes or heat detectors. It is often necessary to mount such equipment above ground level, for example to allow a desired field of vision/illumination, to raise it out of reach or to achieve a satisfactory signal for communications.

[0003] Typically, where elevation of security, safety or communications equipment is required this is achieved by either mounting the equipment on the wall or roof of an existing fixed structure, or by erecting a purpose built tower or mast. Such towers are well known and are typically made of steel and may be formed in a lattice type structure, or a tubular based structure. Both these types of structures provide a strong mounting structure which is relatively simple to manufacture. Other forms of towers are known, such as those formed from reinforced concrete. All these types of towers are typically mounted by the use of a concrete base or plinth into which the tower, or a structural foundation unit thereof, is inserted and supported until the concrete has set. The base or plinth must have a significant mass, sufficient to hold the tower in position and prevent it moving or falling over if subject to, for example, strong winds or assault by vandals or the like.

[0004] Further forms of tower require ballast to retain them in position following deployment. In certain arrangements, ballast is incorporated into the base of a tower in order to stabilise the structure in position.

[0005] There remains a need for means for mounting elevated security, safety or communications that is simple and rapid to erect and that it is readily and easily portable to allow it to be moved to a desired location and deployed quickly. It would also be desirable to have a number of towers deployable together to provide security, safety or communications over a desired area.

[0006] There further remains a need for a means for mounting elevated security, safety or communications without the need to provide ballast to stabilise the structure in position.

[0007] According to the present invention there is provided a tower assembly for mounting security, safety or communications equipment, the tower assembly comprising a plurality of towers, each tower comprising a base and a column, and a carrier unit configured to retain the plurality of towers in their stowed position and from which at least a first base and a first column is removable and at least a second column is mountable upon the carrier unit in the deployed position of the assembly.

[0008] In the stowed position, the base and the column of each of the plurality of towers are separate from one another.

[0009] More specifically, the carrier unit may comprise a first compartment configured to house a plurality of bases of the plurality of towers and a second compartment configured to house a plurality of columns of the plurality of towers.

[0010] The first compartment is preferably below the second compartment.

[0011] The carrier unit preferably comprises a column mounting section. More specifically, the column mounting section is configured to receive a column of a tower of the tower assembly. Even more specifically, the carrier unit column mounting section forms a base of a tower mountable upon the carrier unit in the deployed position of the tower.

[0012] The base of at least one tower is removable from the carrier unit. Further, the column of at least one tower is removable from the carrier unit. In this way, at least one tower is deployable by removing its base and column from the carrier unit and thereafter mounting the column onto the base.

[0013] In various embodiments of the invention, the tower assembly comprises four towers each comprising a base and a column. In these embodiments, three bases and three corresponding columns are removable from the carrier unit. Three towers are formed by mounting a column onto its corresponding base. A further tower is formed by mounting a column onto the column mounting section of the carrier unit. In the further tower, the base of the tower is the column mounting section of the carrier unit.

[0014] In various embodiments, the base of the at least one tower removable from the carrier unit is securable to the ground. More specifically, the base may comprise a column mounting section and at least one ground engaging section. Preferably the base may also comprise anchoring means to anchor the base to the ground. For example the base may be provided with one or more apertures through which a bolt, stake or peg may be passed into the ground beneath the base.

[0015] Preferably the base is a frame. More specifically, the base is a polygonal frame with a minimal height dimension. Contrary to typical tower bases, the base of the present invention is not configured to contain or receive ballast and instead, the stability of the base is provided by the surface area of the base in contact with the ground.

[0016] In preferred embodiments, the base comprises a frame and a column mounting section. More specifically, the frame may comprise a polygonal frame having a column mounting section located centrally on the polygonal frame.

[0017] Suitably the frame is a tubular frame. More specifically, the tubular frame is formed from box section steel tube.

[0018] By forming the base as a frame, the base is a portable unit which is relatively lightweight and easy to

deploy.

[0019] Suitably the base is adapted to provide sufficient balance to stabilize the tower, e.g. prevent it from being toppled by strong winds or vandals or the like.

[0020] An advantage of using the tower assembly of the invention, which does not require to be set in concrete or require a more permanent foundation or ballast, is that it can be erected at any location, with little or no site preparation. This is envisaged as being particularly useful in providing security e.g. at a campsite, festival or fairground. Alternatively it may be useful in increasing security or communications at a site which does not normally require such equipment except for rare occasions, e.g. a race course or the like.

[0021] Preferably the base and the column of each tower are separable, such that the base and column can be transported separated on the carrier unit, and then connected in situ. This provides significant advantages in terms of transporting and positioning the tower assembly. In particular it means that the base of each tower can be positioned as required manually, or with the use of a forklift truck or crane, without the difficulties associated in manoeuvring a tall tower. The column of each tower can then be connected to the base in position.

[0022] The column of each of the towers may suitably comprise a plurality of column sub-units which can be attached together to form the column. The column sub-units can be modular, i.e. each unit is essentially identical, such that the column length is determined by the number of sub-units present. Typically such column sub-unit may be approximately 1 to 2m in length. It should be noted that the column of each tower need not be parallel sided, and indeed in some embodiments may taper along its length. However, a preferred embodiment is a parallel sided column, as this is more convenient for use in a variable length modular structure.

[0023] Significant advantages in portability of the column are achieved as a result of the column being formed from sub-units. For example, it allows the column to be transported in a relatively compact carrier unit, and the sub-units to be moved without the need for lifting equipment. Advantages are also achieved in construction of the tower, where a number of small, comparatively light sub-units can be manoeuvred and connected together and form the column, rather than manoeuvring one single, larger and unwieldy structure.

[0024] Suitably each column sub-unit comprises two end plates with a conduit therebetween. The conduit provides a rigid structure with a lumen along its central axis. Suitably the conduit is polygonal in cross-section, preferably triangular.

[0025] Suitably the end plates are shaped as a corresponding polygon to the conduit. This allows the plates to match the conduit, although they could in practice be effectively any shape. The end plates comprise an aperture near the centre which means that when two upright units are joined together end to end, a continuous lumen through both units is formed. This continuous lumen allows cables or the like to pass down the length of the column to the base. The end plates are suitably also provided with a number of apertures to allow one end plate to be attached, e.g. with nuts and bolts, the end plate of an adjacent sub-unit.

[0026] The conduit of the column sub-unit suitably comprises a number of elongate members (e.g. rods or pipes) equal to the number of corners of the polygonal conduit. The elongate members are attached at one end to each of the corners of a first end plate (such that one elongate number B occupies each corner of the polygonal end plate) and at the other to each of the corners of the second end plate. Thus the elongate members run in parallel and define an outer frame of the conduit.

[0027] In a preferred embodiment there are three pipes and the end plates are triangular, and thus a frame in the general form of a triangular prism is formed.

[0028] In an alternative arrangement, the sub-units of each column may be telescopically extendable. In such arrangements, a second column sub-unit will emerge from the lumen of a first column sub-unit. In preferred embodiments, a telescopic column will comprise three column sub-units. When fully extended, the sections may be locked in the extended position by clip fasteners at the joints between the first and the second and also the second and the third column sub-units.

[0029] Embodiments wherein the column of the tower is telescopically extendible, erection and deployment times for the towers are particularly rapid and advantageous.

[0030] The frame is suitably covered with a suitable sheet material, such as metal sheet or metal mesh. A mesh material is generally preferred as it will allow at least a portion of wind hitting the column to pass through it, thus reducing the force imparted on the tower by high winds.

[0031] Suitably the tower comprises an equipment mount attached at the top of the column. Preferably the equipment mount comprises attachment means for attaching the equipment mount to the column, preferably at the top of the column, and a mounting means for attaching equipment to the equipment mount. Suitably the attachment means comprises a plate essentially identical to the end plate of the column sub-unit, thus allowing simple attachment thereto. Suitably the mounting means comprises a circular plate provided with a plurality of apertures arranged concentrically on the plate.

[0032] Suitably the apertures are equally spaced in the plate. In one embodiment the apertures are slots which extend in an arc, preferably the arc extends for around 30 to 60°. Suitably there are 4 slots.

[0033] The equipment mount conveniently comprises a conduit separating the mounting means and the attachment means. Conveniently, the conduit may be a tube of circular cross section, although other conduits may be suitable. Preferably the mounting plate and the attachment plate having apertures provided such that a lumen extends through the equipment mount, thus allowing ca-

bles and the like to pass through it.

[0034] The tower can be provided with anti-climbing means to prevent or deter climbing of the tower. Suitably the anti-climbing means comprises at least one spike projecting outwardly and downwardly from the column.

[0035] Preferably the anti-climbing means comprises a plurality of spikes projecting outwardly and downwardly from the column, the spikes substantially forming a ring around the circumference of the column. Suitably the anti-climbing means is adapted to be attached to the tower at the join of two adjacent column sub-units. In one embodiment, the anti-climbing means comprises a plurality of spike units, each spike unit providing spikes on one face of the polygonal column.

[0036] Suitably the tower comprises at least one item of security, safety or communications equipment. This equipment may be attached at any point on the base or column of the tower. It is preferred that the equipment is attached to the column, and above the anti-climbing means, if present. Suitably the equipment is attached to an equipment mount attached to the top of the column. Alternatively or additionally, equipment may be attached at any point on the column; this may be conveniently achieved at the joint between two adjacent column sub-units, optionally through the use of an equipment mount adapted to interact with the means of connecting the sub-units together.

[0037] Suitable security, safety or communications equipment for mounting on the tower includes, for example, cameras (e.g. CCTV cameras), lights (e.g. floodlights), motion detectors, heat detectors, antenna, sirens, loud speakers or microphones.

[0038] In a preferred embodiment of the present invention each column is retained the stowed position by a column receiving means of the carrier unit.

[0039] Preferably the carrier unit comprises a plurality of column receiving means.

[0040] In embodiments of the invention, the carrier unit comprises at least one column receiving means for each column of the tower assembly. More specifically, the carrier unit may comprise a plurality of column receiving means with a column receiving means configured to support each end of a column.

[0041] The carrier unit may comprise at least one pair of column receiving means with each column receiving means of the pair configured to support an opposing end of a column of the tower assembly.

[0042] In embodiments, the column receiving means may comprise a flange extending from the carrier unit. More specifically, the carrier unit may comprise a forward facing and/or a rearward facing flange configured to support an end of a column of the tower assembly.

[0043] In embodiments wherein the carrier unit comprises a pair of flanges and/or a forward facing and a rearward facing flange, the flanges are preferably at opposing ends of the carrier unit and are configured to support opposing ends of a column of the tower assembly.

[0044] In embodiments of the invention, the carrier unit may comprise a plurality of pairs of flanges and/or a plurality of forward facing and rearward facing flanges configured to support opposing ends of a plurality of columns of the tower assembly. In such embodiments, a first pair of flanges may be located above a second pair of flanges. In this way, the columns supported on the pairs of flanges are stowed in a stacked arrangement on the carrier unit.

[0045] A flange may be configured to support an end of each of a plurality of columns in a side-by-side arrangement. Alternatively, or in addition, a plurality of flanges may be configured to support an end of each of a plurality of columns in a side-by-side and/or a stacked arrangement.

[0046] The column receiving means may comprise a support plate upstanding from the carrier unit and being substantially perpendicular thereto. In preferred embodiments, the support plate is upstanding from the carrier unit proximate an edge thereof. More specifically, the support plate may be upstanding from the carrier unit at an end thereof.

[0047] The support plate preferably comprises at least one column receiving recess therein. More specifically, the support plate comprises at least one column receiving recess in an upper edge thereof. It is preferable that the at least one column receiving recess is sized and shaped to receive a column proximate an end of that column.

[0048] In embodiments of the invention, the support plate comprises a plurality of column receiving recesses. More specifically, the support plate may comprise a column receiving recess for each column of the tower assembly. In this way, the columns may be retained in the stowed position in a compact side-by-side arrangement.

[0049] In certain embodiments of the invention, the carrier unit may comprise a pair of column receiving means. More specifically, the carrier unit may comprise a support plate and a flange each configured to support and retain an end of a column of the tower assembly.

[0050] In embodiments, an end of each of the columns of the tower assembly is supportable upon a flange and/or a column receiving recess of a support plate and the opposing end of each column is supportable upon a further flange and/or a further column receiving recess of a support plate. Thus, a column may be located on the pair of flanges at its ends in the stowed position and may easily be slidably removed from the flanges when the column is to be deployed.

[0051] In an arrangement, the carrier unit comprises four column receiving means. More specifically, two pairs of column receiving means are located on the carrier unit. The two pairs of column receiving means are preferably located transversely across the carrier unit perpendicular to the longitudinal centre line of the carrier unit. More specifically, one pair of column receiving means is located at an end of the carrier unit and an opposing pair of column receiving means is located at the other end of the carrier unit.

[0052] Preferably, a first column receiving means is located above and parallel to a second column receiving

unit within each pair of column receiving units.

[0053] In embodiments of the invention, the carrier unit comprises a frame. More specifically, the carrier unit may comprise a tubular frame. Even more specifically, the tubular frame may be formed of box section steel, or the like. In this way, the carrier unit is lightweight and portable and, therefore, easily moveable into position.

[0054] In embodiments of the invention, the carrier unit comprises end sections configured to support each of a plurality of columns when same are in the stowed position.

[0055] More particularly, at least one end section may comprise a frame.

[0056] Alternatively or, in addition, at least one end section may comprise a plate. More specifically, the plate may be a solid flat member. The plate may be fixed into position or, alternatively may be removably locateable on the carrier unit. In embodiments comprising a removably locateable plate, the plate may be retained in position on the carrier unit by one or more support structures. More specifically, the plate may be slidably engageable with the support structures. The support structures may be retaining posts each having a groove therein for receiving and retaining the plate.

[0057] In embodiments of the invention, the end section may comprise the column receiving means.

[0058] In exemplary embodiments, the plate may comprise column receiving recesses in an upper edge thereof. The plate may comprise or may further comprise a column receiving flange thereon.

[0059] The carrier unit may comprise support structures. In this way, strength will be conferred on the otherwise lightweight structure.

[0060] A control unit may be attachable to the carrier unit. More specifically, the control unit may be attachable to the carrier unit at an end thereof.

[0061] Alternatively, the control unit may be integral with the carrier unit.

[0062] In embodiments of the invention, the column receiving means may be integral with or, in alternative embodiments, may be separate from, the control unit.

[0063] In embodiments, at least one column receiving flange extends from the control unit rearwardly of the carrier unit. More specifically, there may be two column receiving flanges extending from the control unit rearwardly of the carrier unit. In certain embodiments, one of the column receiving flanges may be positioned above the other and parallel therewith. Alternatively, the two column receiving flanges may be co-planar with one another in a side-by-side arrangement.

[0064] In embodiments, at least one column receiving flange extends forwardly of the carrier unit. More specifically, there may be two column receiving flanges extending forwardly of the carrier unit. In certain embodiments, one of the column receiving flanges may be positioned above the other and parallel therewith. Alternatively, the two column receiving flanges may be co-planar with one another in a side-by-side arrangement.

[0065] At least the bottom portion of a column of each tower is correspondingly shaped and sized with the column mounting section in the base of each tower. In other words, the base and column sub units are designed to cooperate such the column sub-units can be conveniently accommodated within the base of each tower.

[0066] This has an advantage in terms of portability as it means the tower can be conveniently transported, with all structural elements contained on a single, easily portable carrier unit. Suitably four or more column sub-units and corresponding bases can be accommodated within the carrier unit.

[0067] In a further aspect of the invention, the carrier unit is also adapted to accommodate one or more of an equipment mount, an anti-climb means, security equipment, safety equipment or communications equipment. The carrier unit preferably further comprises a control unit. The control unit is operable to control the security, safety or communications equipment to be mounted on the towers of the tower assembly. Advantageously, the control unit is located in a third compartment of the carrier unit. More specifically, the control unit is located in a lockable compartment of the carrier unit.

[0068] In various embodiments, the security, safety or communications equipment on the plurality of towers is controllable by the control unit. Communication between the control unit and the security, safety or communications equipment on each tower may be provided by any suitable means such as, for example, wired or wireless communication.

[0069] Advantageously the carrier unit further comprises transportation facilitation means. More specifically, the carrier unit comprises wheels, tracks or the like. In this way the carrier unit is easily movable between locations.

[0070] The carrier unit may further comprise stabilisation means. More specifically, the carrier unit further comprises deployable legs which are movable between a stowed position and a deployed position. In the stowed position, the deployable legs do not hinder the movement of the carrier unit. In the deployed position, the deployable legs of the carrier unit act to prevent movement of the carrier unit.

[0071] In various embodiments of the invention, the deployable legs comprise a foot at an end thereof. In this way, the load of the carrier unit is spread across the surface area of the foot which, in the deployed position of the leg, is in contact with the ground.

[0072] In various embodiments of the invention, the deployable legs comprise a lockable means. In this way, the carrier unit may be locked in position preventing its removal from the desired location.

[0073] According to another aspect, the present invention provides a method of erecting a tower assembly, the method comprising the steps of (a) providing a tower assembly comprising a plurality of towers each comprising a base and a column, and a carrier unit comprising a column mounting section; (b) removing at least one base

and at least two columns from the carrier unit; (c) attaching at least one column to the at least one base; and (d) attaching at least one column to the column mounting section of the carrier unit.

[0074] Suitably steps (c) and (d) comprise the step of constructing the column from column sub-units.

[0075] Suitably the method further comprises the step of attaching to each of the plurality of towers one or more of anti-climb means, equipment mount means, security equipment, safety equipment, communications equipment and a control box.

[0076] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprises", means "including but not limited to", and is not intended to (and does not) exclude other components, integers or steps.

[0077] Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0078] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig 1 is a schematic representation of a first tower in accordance with an embodiment of the present invention;

Fig 2 is a schematic representation of a second tower in accordance with an embodiment of the present invention in which the base is the carrier unit of the tower assembly;

Fig 3 is a schematic representation of a tower assembly in accordance with an embodiment of the present invention in the fully stowed position;

Fig 4 is a side view of a schematic representation of a tower assembly in accordance with a further embodiment of the present invention in the fully stowed position;

Fig 5 is an end plan view of the tower assembly of Fig 4;

Fig 6 is a top plan view of the tower assembly of Figs 4 and 5;

Fig 7 is a top plan view of a schematic representation of a carrier unit of a tower assembly according to an embodiment of the invention with the columns and bases removed; and

Fig 8 shows a column sub-unit and an end plate according to an embodiment of the invention.

[0079] While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

[0080] Further, although the invention will be described in terms of specific embodiments, it will be understood that various elements of the specific embodiments of the invention will be applicable to all embodiments disclosed herein.

[0081] In the drawings, similar features are denoted by the same reference signs throughout.

[0082] A tower assembly comprises a plurality of towers each comprising a base and a column. A tower deployed from the tower assembly is depicted in Figure 1 and generally denoted by reference numeral 10. Mounted atop the tower 10 is security, safety or communications equipment 12. Each tower 10 of the tower assembly comprises a tubular frame base 20 adapted to be secured to the ground and a column 30 extending upwards from the base 20. In the depicted embodiment, column 30 is comprised of two column sub-units with the upper of the sub-units extending telescopically from the lumen of the lower of the column sub-units. The sub-units, once extended, are locked into position so as to prevent the sub-units collapsing into one another unintentionally. In alternative arrangements not depicted in Figure 1, modular column sub-units may be deployed and attached together to form column 30.

[0083] Suitably the base 20 is a square frame, the sides 22 of which are formed from box section steel tube to form a perimeter frame. Cross-members 24 formed from box section steel tube are provided extending across the space between the edges 22 of the perimeter frame of the square, thus providing additional support to the frame.

[0084] In one embodiment the square frame sides are approximately 1.25m.

[0085] The corners of the base frame 20 are provided with a corner bracket 33 formed from a plate piece of steel extending from the corner of the perimeter frame. The corner bracket is provided with an aperture through which a bolt, peg or spike can be passed to secure the base 20 to the ground beneath the base.

[0086] The base 20 has a column mounting plate 32 for receiving the column 30 of the tower 10. The column mounting plate 32 with a number of apertures (not shown) positioned to align with corresponding apertures on an end plate of the column 30 of the tower 10, for attachment thereto.

[0087] The tower assembly further comprises a single tower mountable upon a carrier unit of the tower assembly. Such a tower is depicted in Figure 2. The tower 100

is mountable on the carrier unit 110 of the tower assembly.

[0088] Mounted atop the tower 100 is security, safety or communications equipment 12. The tower 100 of the tower assembly comprises a column 30 extending upwards from the carrier unit 110.

[0089] The carrier unit 110 has a tubular steel frame with a column mounting plate 132 for receiving the column 30 of the tower 100. The column mounting plate 132 has a number of apertures (not shown) positioned to align with corresponding apertures on an end plate of the column 30 of the tower 100, for attachment thereto.

[0090] As is best shown in Figures 3 and 4, the tower assembly is initially provided in a fully stowed position. In the depicted embodiment of Figure 4, the carrier unit 110 of the tower assembly houses four base frames 20 and four columns 30.

[0091] The carrier unit 110 also comprises a control unit 112 which, in use, controls the operation of the equipment 12 mounted on the towers of the assembly.

[0092] Carrier unit 110 is transportable to any desired location due to the presence of wheels 114. When at the desired location, further movement of the carrier unit 110 may be prevented by deployment of stabilising legs 116. Feet 118 on legs 116 operate to prevent legs 116 from breaking the surface of the ground under the carrier unit 110.

[0093] Figure 4 depicts a side view of the carrier unit 110 of Figure 3. The embodiments of Figures 3 and 4 differ with respect to the column receiving means which, as seen in Figures 2 and 3, are formed as column receiving recesses 42 in the upper edge of support plate 44. Support plate 44 is slidably located into grooves in support posts 46 so as to be retained therein. The column receiving means of Figure 4 are in the form of flanges (122 in Figure 5).

[0094] Figure 4 shows stabilising legs 116 in their retracted position, thus the carrier unit 110 is moveable between locations. In the embodiment of the carrier unit 110 shown in Figure 4, the columns 30 of the towers of the tower assembly are shown in a stacked arrangement as opposed to the side-by-side arrangement shown in Figure 3. A stacked arrangement of columns 30 allows a more compact carrier unit 110.

[0095] In Figure 5, the column receiving flanges 122 are shown. A column 30 is slidable onto a column receiving flange 122 of the carrier unit 110 and is demountable therefrom when required. The depicted embodiment shows four column receiving flanges 122, facing forwardly of carrier unit 110 and arranged as two pairs of flanges one pair at either side of the longitudinal midline of carrier unit 110.

[0096] Figure 6 depicts an even further configuration of the carrier unit of the tower assembly according to the invention. In the depicted configuration, the columns 30 are arranged in two pairs either side of the longitudinal mid-line of the carrier unit. The columns in this arrangement are co-planar in the stowed position.

[0097] Figure 7 shows the carrier unit of Figure 6 with all of the columns 30 removed therefrom. Once the columns 30 are demounted from the carrier unit 110 ready for deployment of the tower assembly, column mounting plate 132 on the carrier unit 110 is clearly shown. A column 30 may be mounted into column receiving plate 132 and attached thereto. Thus, carrier unit 110 becomes the base of one of the towers of the tower assembly.

[0098] Referring to Figure 8, each column 30 consists of a number of modular column sub-units 50. Each column sub-unit comprises a conduit 52, which is triangular in cross-section.

[0099] The conduit 52 is formed from three steel tubes (of approximate length 1.20 m), which are mounted at each end onto a end plate 56 shaped essentially as an equilateral triangle. The tubes are attached at each corner of the end plate 56 and are thus arranged to form the edges of the triangular conduit 52. The faces of the triangular conduit 52 are covered with sheet material (i.e. metal mesh) to prevent access and protect the contents of the conduit 52. The end plates 56 have an aperture in their centre to allow cables or the like to pass from one sub-unit to the next. The end plates 56 of the column sub-units 50 are further provided with three of apertures along each edge the plate 56 to allow the sub-units to be attached together or to the base frame 20, suitably with bolts.

[0100] Typically three apertures 60 are provided on each of the three edges of the end plate 56, though more or less could of course be used.

[0101] The number of column sub-units 50 can be varied to alter the height of the tower 10 as required, and this is an advantage of the modular system as described. A tower 10 of the tower assembly in accordance with the present invention will typically be between 3 and 7 meters tall. Although it will be appreciated that effectively any height of tower, within reason, could be constructed.

[0102] The shape and size of the column sub-units is such that they will fit within the edges of the carrier unit, i.e. they are slightly shorter than the greatest dimension of the carrier. This conveniently allows the column sub-units to be accommodated on the carrier unit during transportation.

[0103] At the top of the column 30, an equipment mount is provided. The equipment mount may generally be any member which allows the attachment of the desired item of security, safety or communications equipment 12 to the uppermost end plate 56 of the column sub-unit 50.

[0104] The carrier unit is provided with a control panel for controlling the equipment attached to the tower 10. The control panel is located within the carrier unit so that it is inaccessible when the openable face of the compartment of the carrier unit in which the control panel is located is locked.

[0105] In use the tower assembly is brought to the location where it is to be erected in parts for assembly on site. The ability 24 of the tower 10 to be assembled on site has significant advantages in terms of the ease of

transportation.

[0106] A base 20 is removed from the carrier unit and is placed in position. The base 20 of each tower 10 is bolted in position or stakes driven into the ground. Where the ground beneath the tower is relatively soft stakes may be preferred. Where the ground is concrete, holes can easily be drilled for use of expansion bolts.

[0107] A column 30 is removed from the carrier unit and is erected on the base frame 20 (i.e. connected to the base frame 20).

[0108] Once all columns 30 are removed from the carrier unit, a column 30 is erected on the column mounting plate on the carrier unit.

[0109] Generally the column 30 is constructed to its final form, i.e. complete with safety, security or communications equipment 12 prior to attachment to the base 20. It is generally more convenient to attach the column 30 to the base 20 which is in an 2 upright position, and which has been previously secured to the ground. The column 30 is lifted into position manually, or preferably with the assistance of a crane. It is then attached via the end plate 56 of the lowermost column sub-unit to the mounting plate 32 on the top of the base 20 this may be achieved using nuts and bolts, e.g. nine M10 nuts and bolts.

[0110] Modifications to the described embodiments can be made without departing from the scope of the invention. For example, the upright column could be manufactured to be telescopic or in one piece. The cross-section of the column could be other than triangular, for example round or box section. The base unit could be made any shape which is suitable to secured to the ground and stowable on the carrier unit. Equipment can be attached at any point on the column or base.

Claims

1. A tower assembly for mounting security, safety or communications equipment, the tower assembly comprising a plurality of towers, each tower comprising a base and a column, and a carrier unit configured to retain the plurality of towers in their stowed position and from which at least a first base and a first column is removable and at least a second column is mountable upon the carrier unit in the deployed position of the assembly.

2. A tower assembly according to claim 1, wherein the carrier unit comprises a first compartment configured to house a plurality of bases of the plurality of towers and a second compartment configured to house a plurality of columns of the plurality of towers.

3. A tower assembly according to claim 1 or 2, wherein the carrier unit comprises a column mounting section.

4. A tower assembly according to claim 3, wherein the carrier unit column mounting section forms a base of a tower mountable upon the carrier unit in the deployed position of the tower.

5. A tower assembly according to any one of the preceding claims, wherein the base of the at least one tower removable from the carrier unit is securable to the ground.

6. A tower assembly according to claim 5, wherein the base may comprise a column mounting section and at least one ground engaging section.

7. A tower assembly according to any one of the preceding claims, wherein the base of the at least one tower removable from the carrier unit comprises a frame and a column mounting section.

8. A tower assembly according to any one of the preceding claims, wherein the base and the column of each tower are separable, such that the base and column can be transported separated on the carrier unit, and then connected in situ.

9. A tower assembly according to any one of the preceding claims, wherein the column of each of the towers comprises a plurality of column sub-units which can be attached together to form the column.

10. A tower assembly according to claim 9, wherein each column sub-unit comprises two end plates with a conduit therebetween.

11. A tower assembly according to any one of claims 1 to 8, wherein the column of each of the towers comprises a plurality of column sub-units the sub-units of each column being telescopically extendable.

12. A tower assembly according to any one of the preceding claims, wherein the carrier unit comprises a plurality of column receiving means.

13. A tower assembly according to any one of the preceding claims, wherein the carrier unit comprises end sections configured to support each of a plurality of columns when same are in the stowed position.

14. A method of erecting a tower assembly, the method comprising the steps of:

    (a) providing a tower assembly comprising a plurality of towers each comprising a base and a column, and a carrier unit comprising a column mounting section;
    (b) removing at least one base and at least two columns from the carrier unit;
    (c) attaching at least one column to the at least

one base; and
(d) attaching at least one column to the column mounting section of the carrier unit.

15. A method according to claim 14, wherein steps (c) and (d) comprise the step of constructing the column from column sub-units.

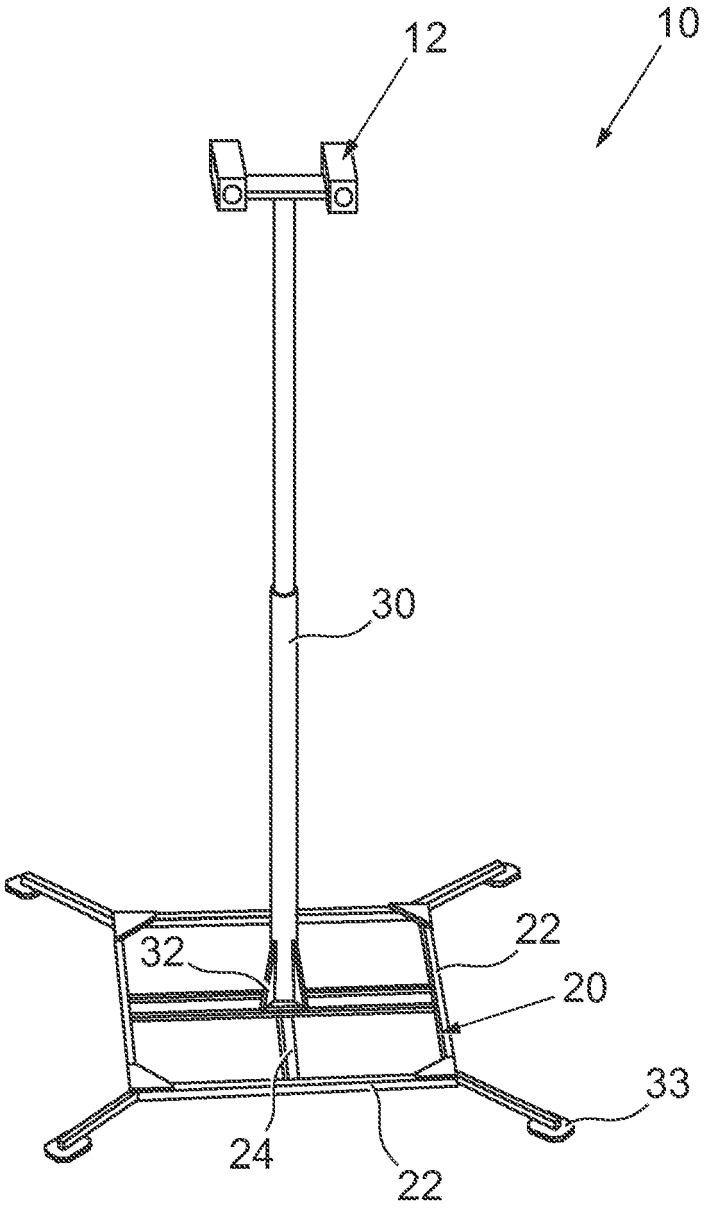

Fig. 1

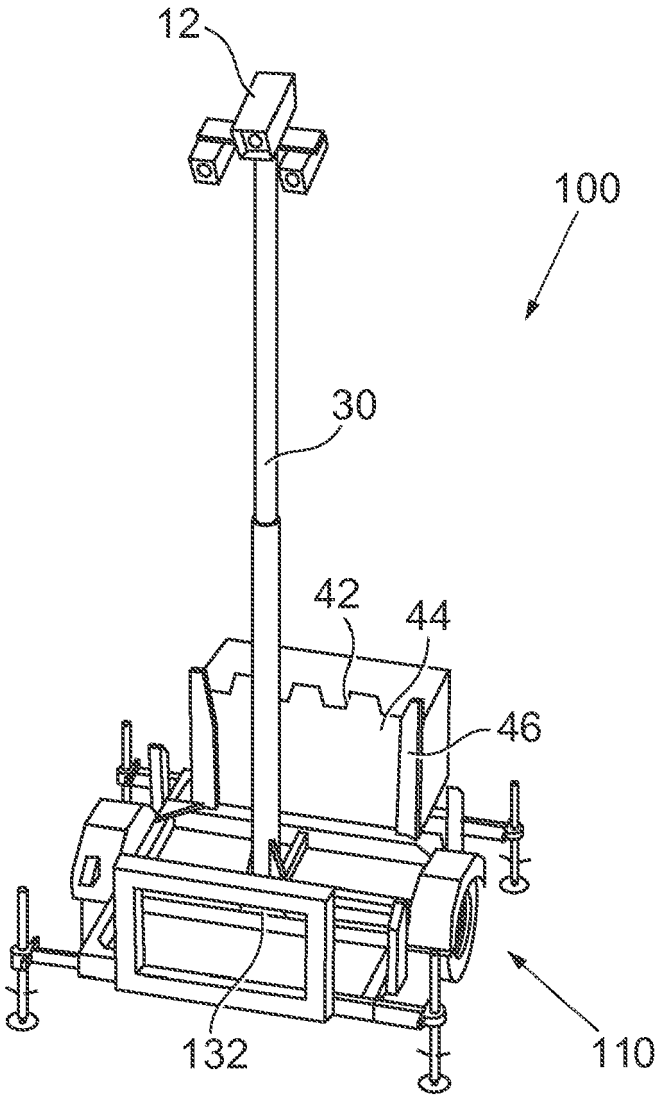

Fig. 2

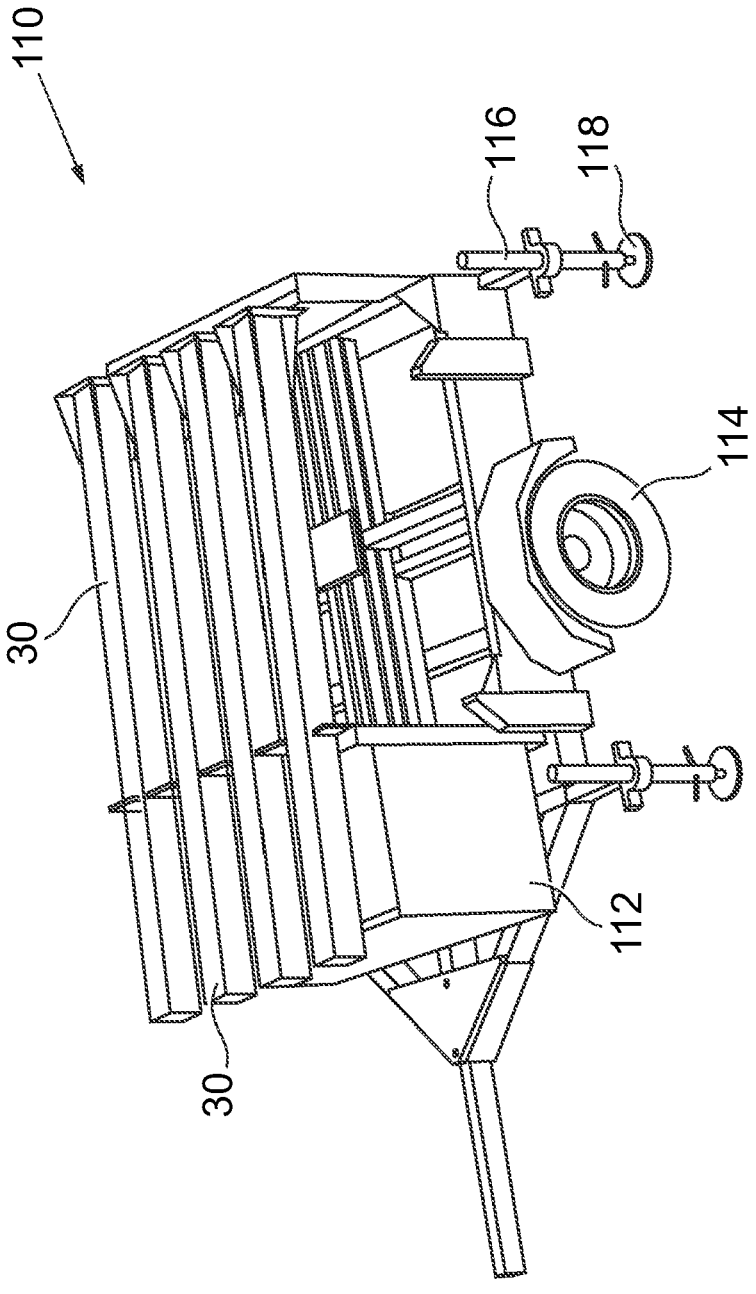

Fig. 3

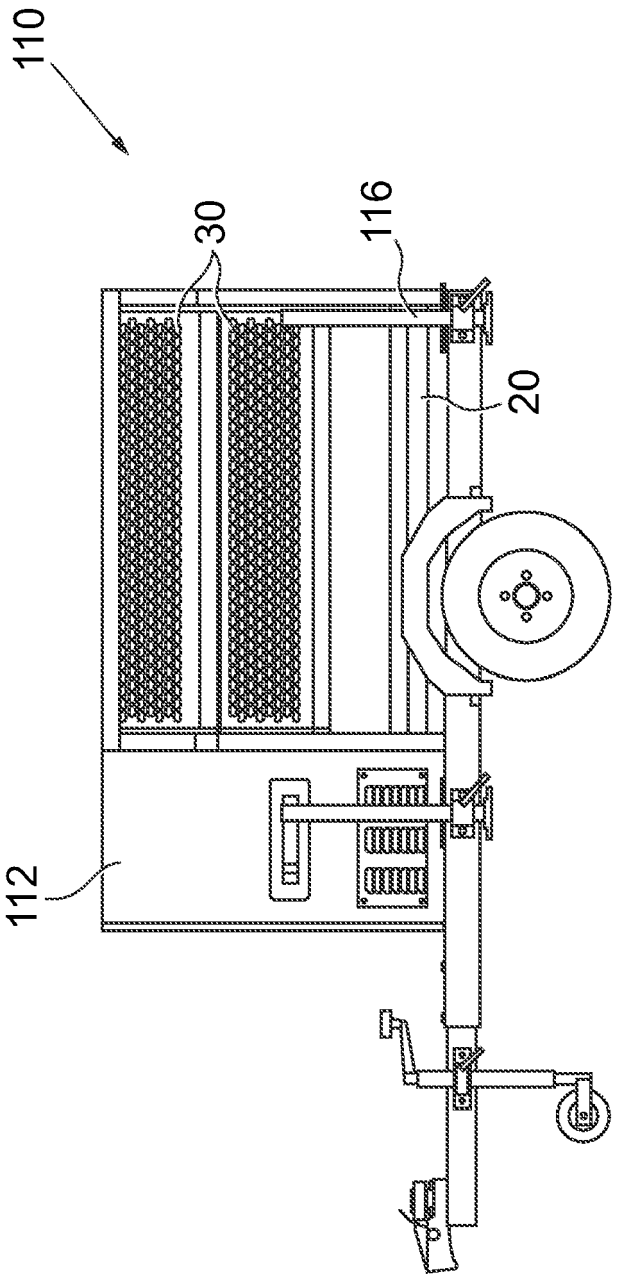

Fig. 4

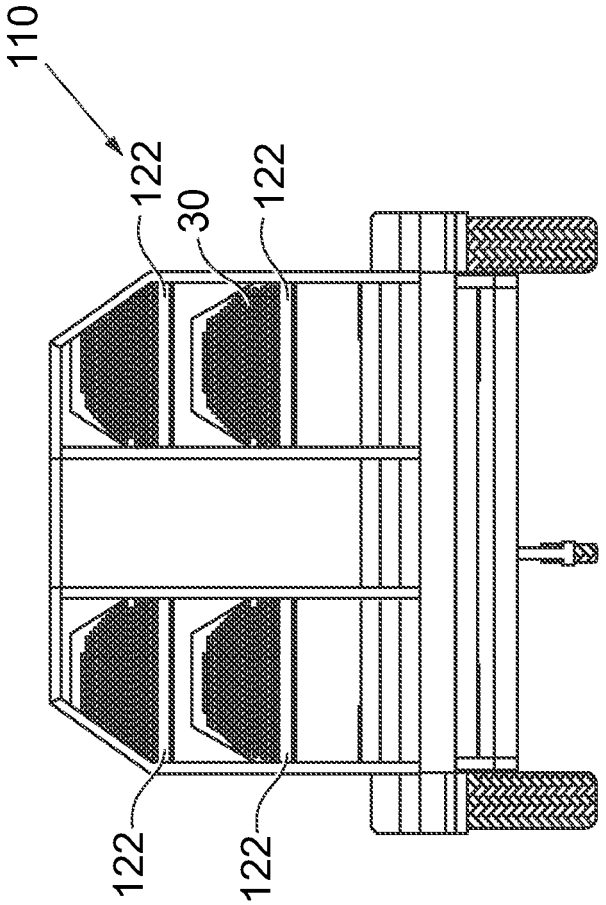

Fig. 5

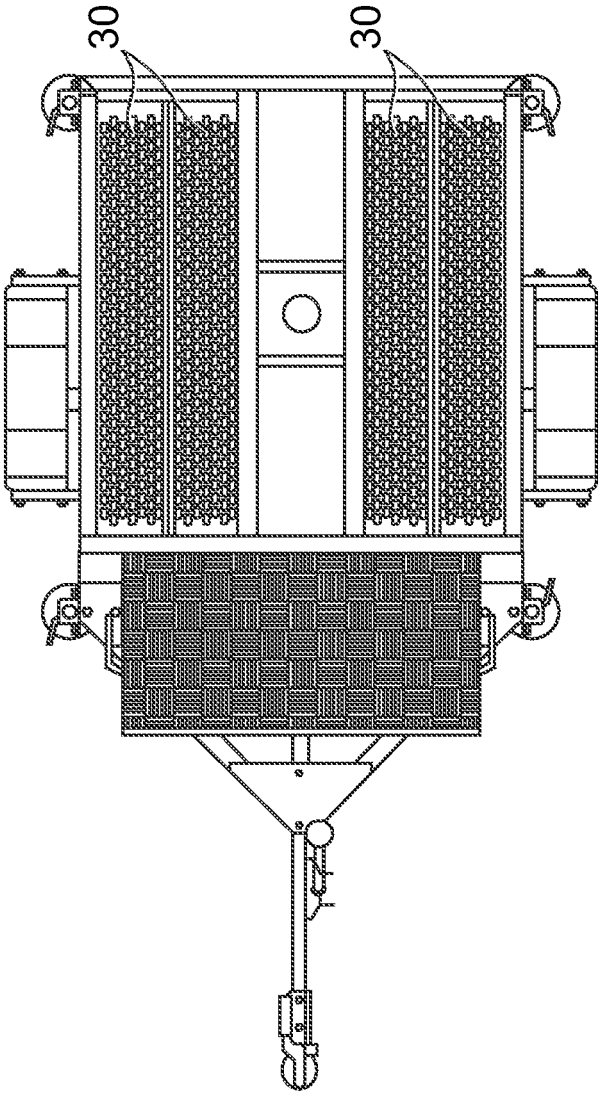

Fig. 6

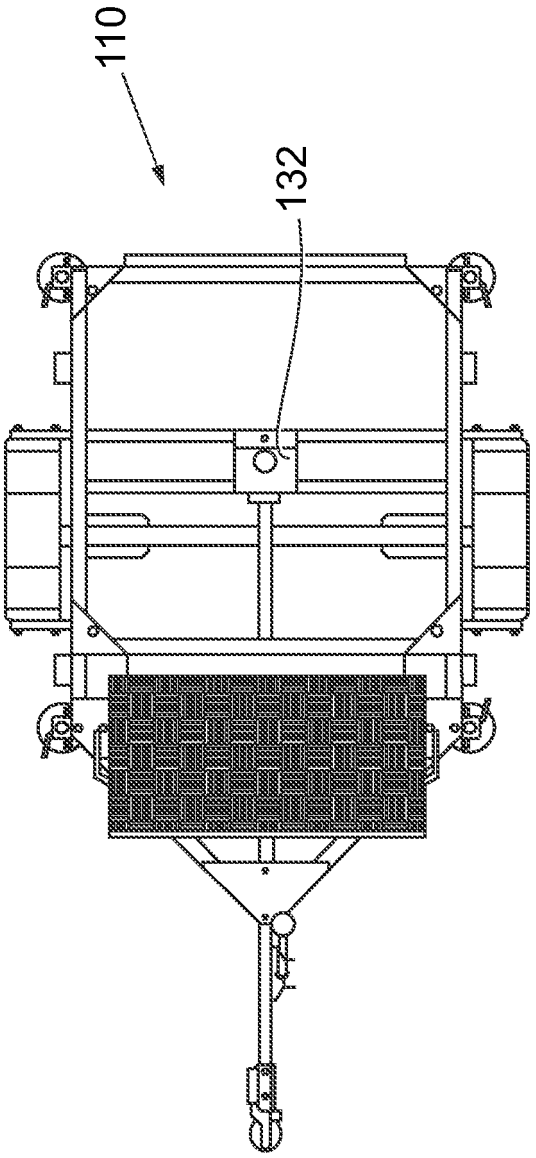

Fig. 7

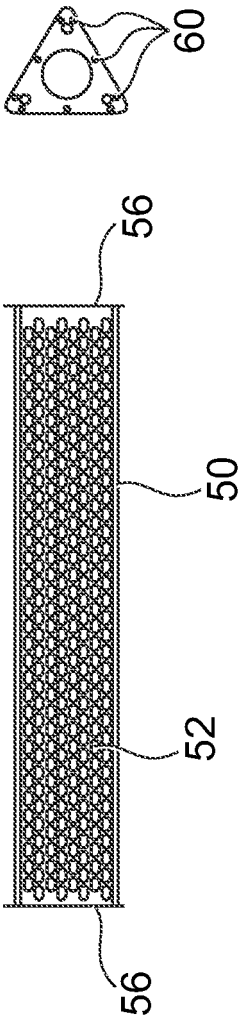

Fig. 8