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(54) **BUILDING TIE DOWN KIT FOR SECURING ROOFS, DOORS, AND WINDOWS AGAINST STORM WIND DAMAGE AND METHOD OF ASSEMBLY**

(76) Inventor: **Alfonso Oviedo-Reyes**, Miami, FL (US)

Correspondence Address:
Frank L. Kubler, Esquire
13261 S.W. 54th Court
Miramar, FL 33027 (US)

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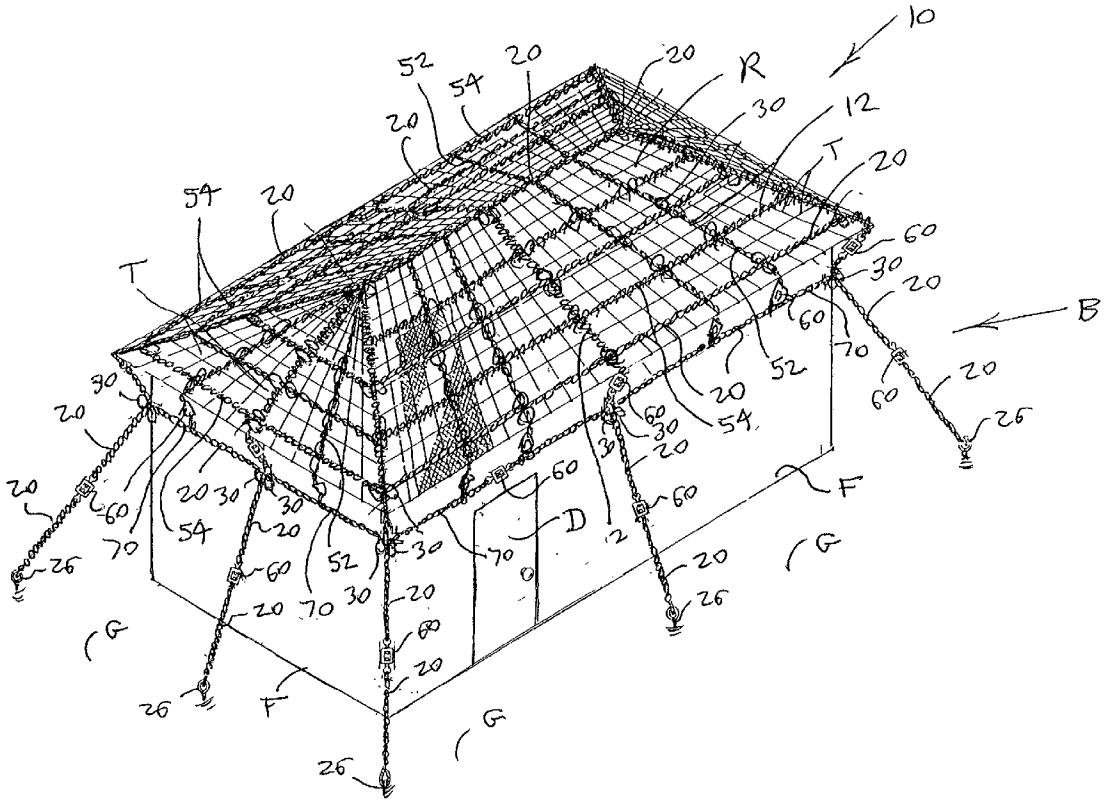
(57) **ABSTRACT**

A chain net tie down kit includes several multilink chain segments; several chain connecting mechanisms for connecting the chain segments for forming a chain net matching the size and dimensions of a particular portion of a building; and several chain anchoring fasteners for anchoring the chain net over the particular portion of a building. The several chain anchoring fasteners preferably include at least one of: a wall anchoring fastener and a ground anchor. The chain net tie down kit preferably additionally includes several door anchoring fasteners. The chain net tie down kit preferably still additionally includes several window frame anchoring fasteners. The chain segments optionally are of uniform length. The chain segments alternatively are of varied lengths. Groups of the several chain segments optionally are provided pre-assembled into modular net sections for linking together to construct a composite chain net.



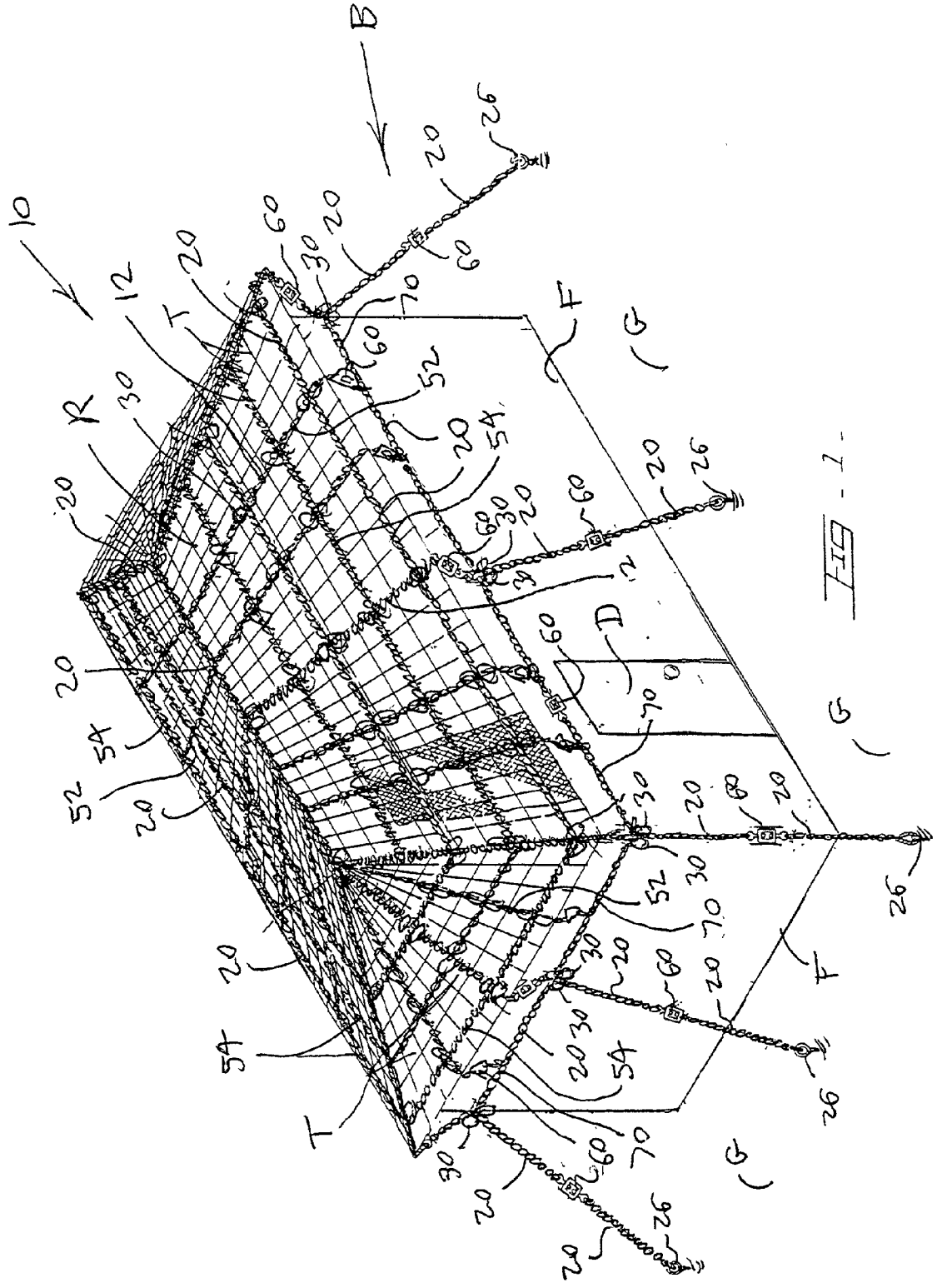


FIG - 1 -

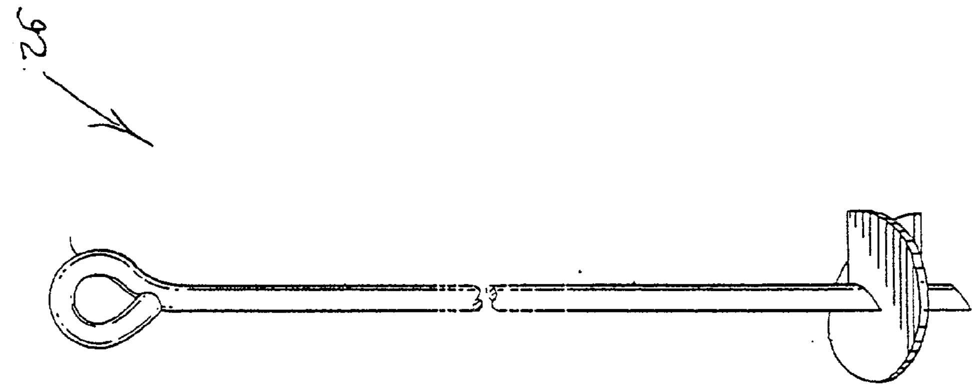


FIG. 4

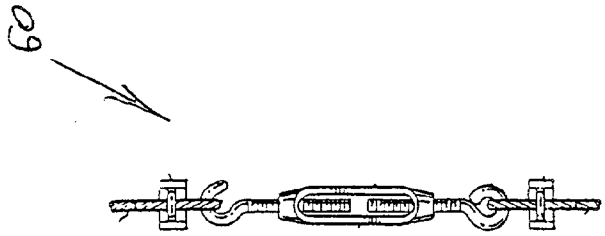


FIG. 3

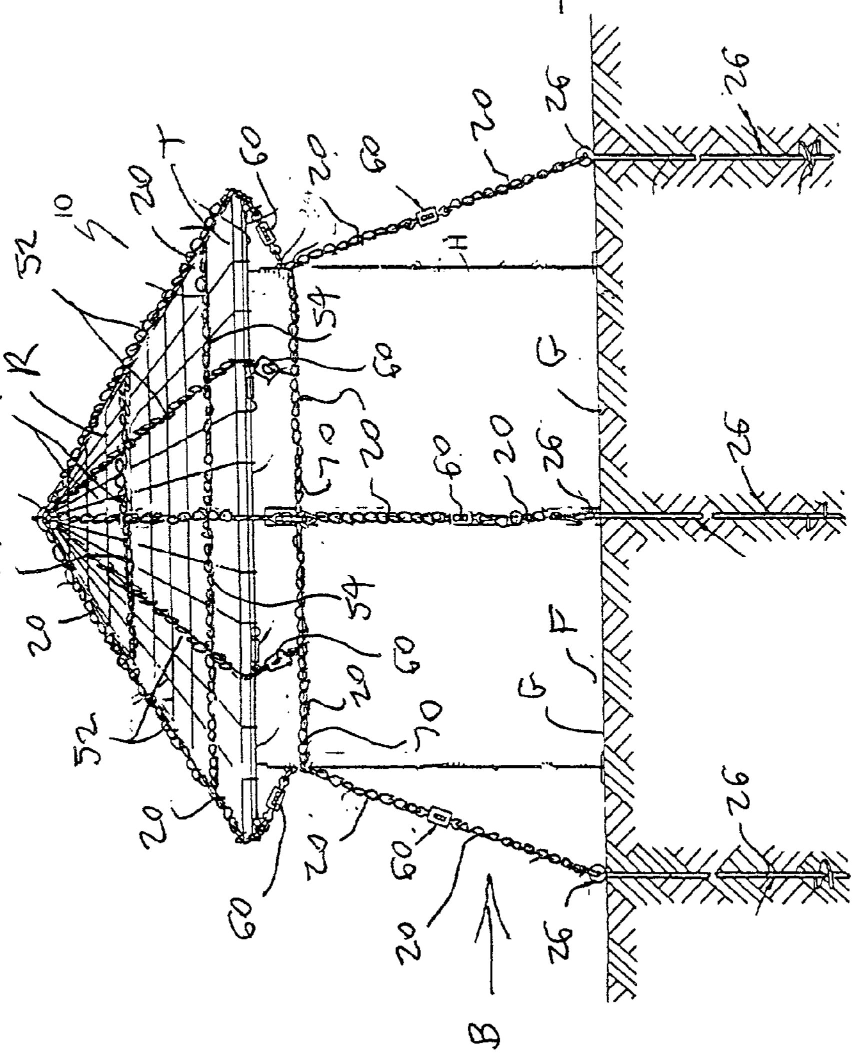


FIG. 2

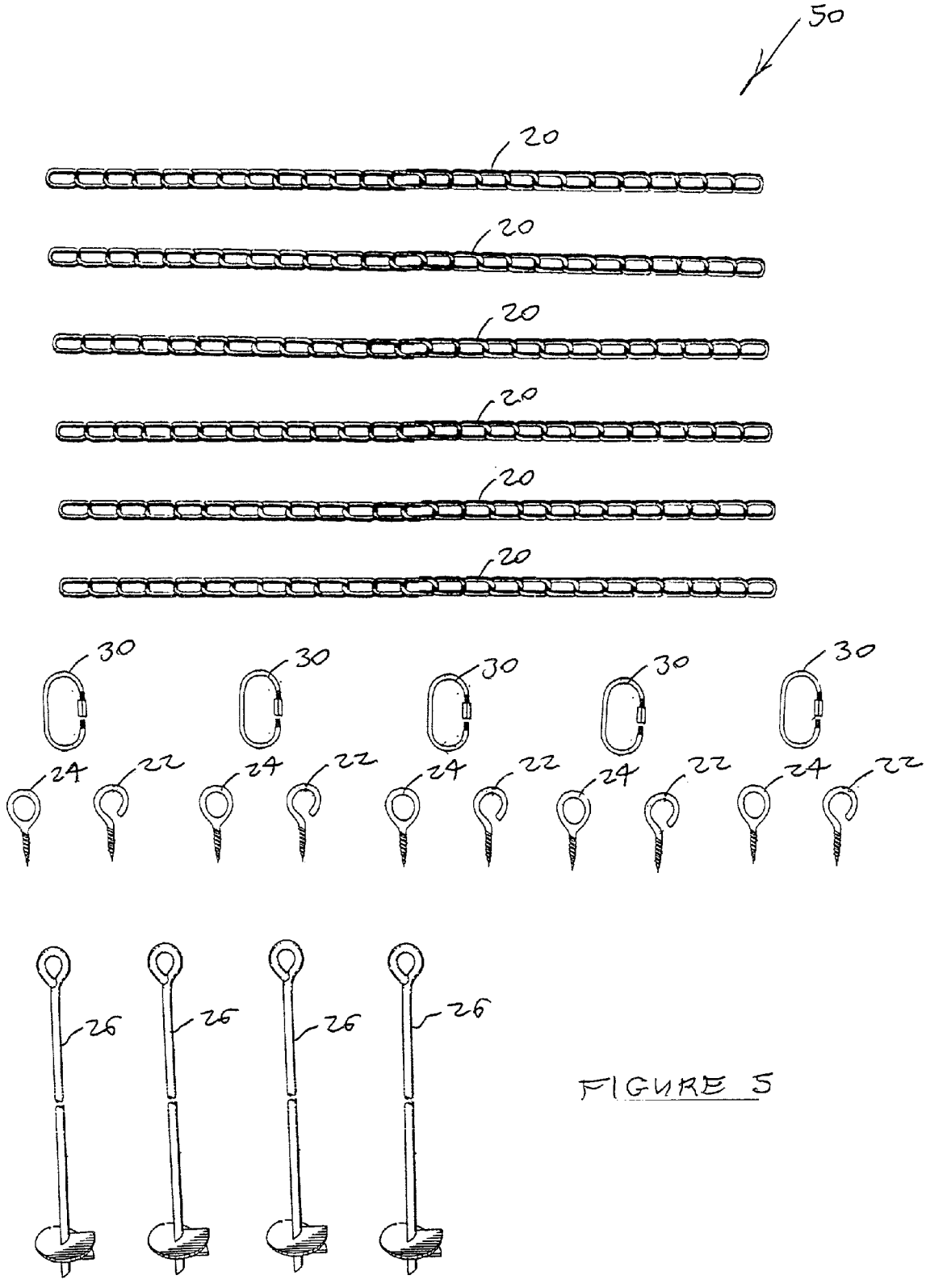

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FIGURE 5

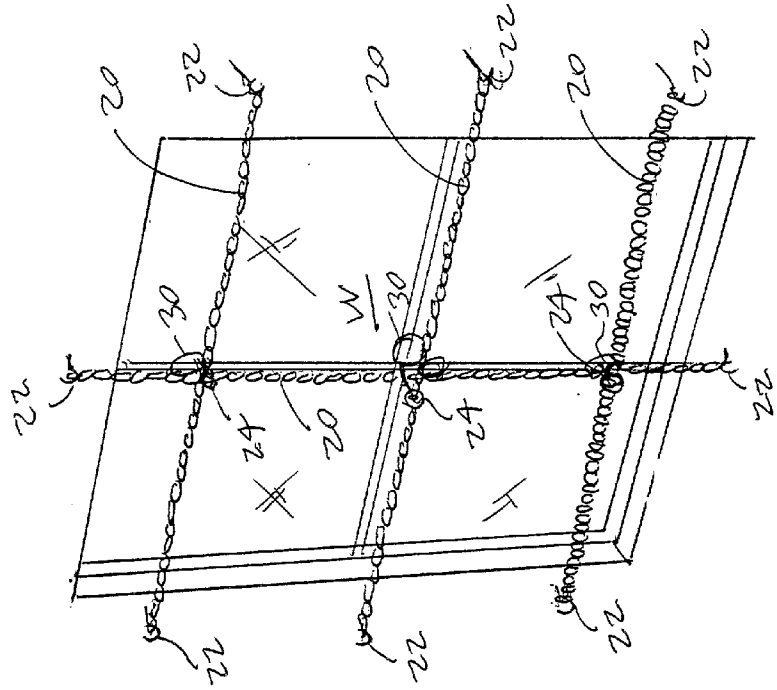

FIGURE 7

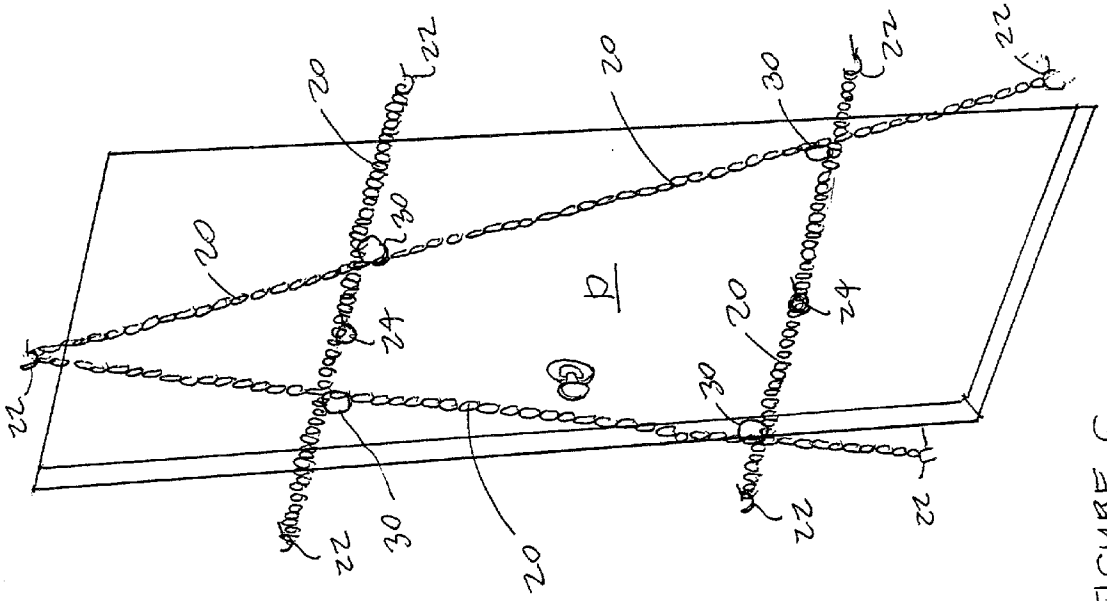

FIGURE 6

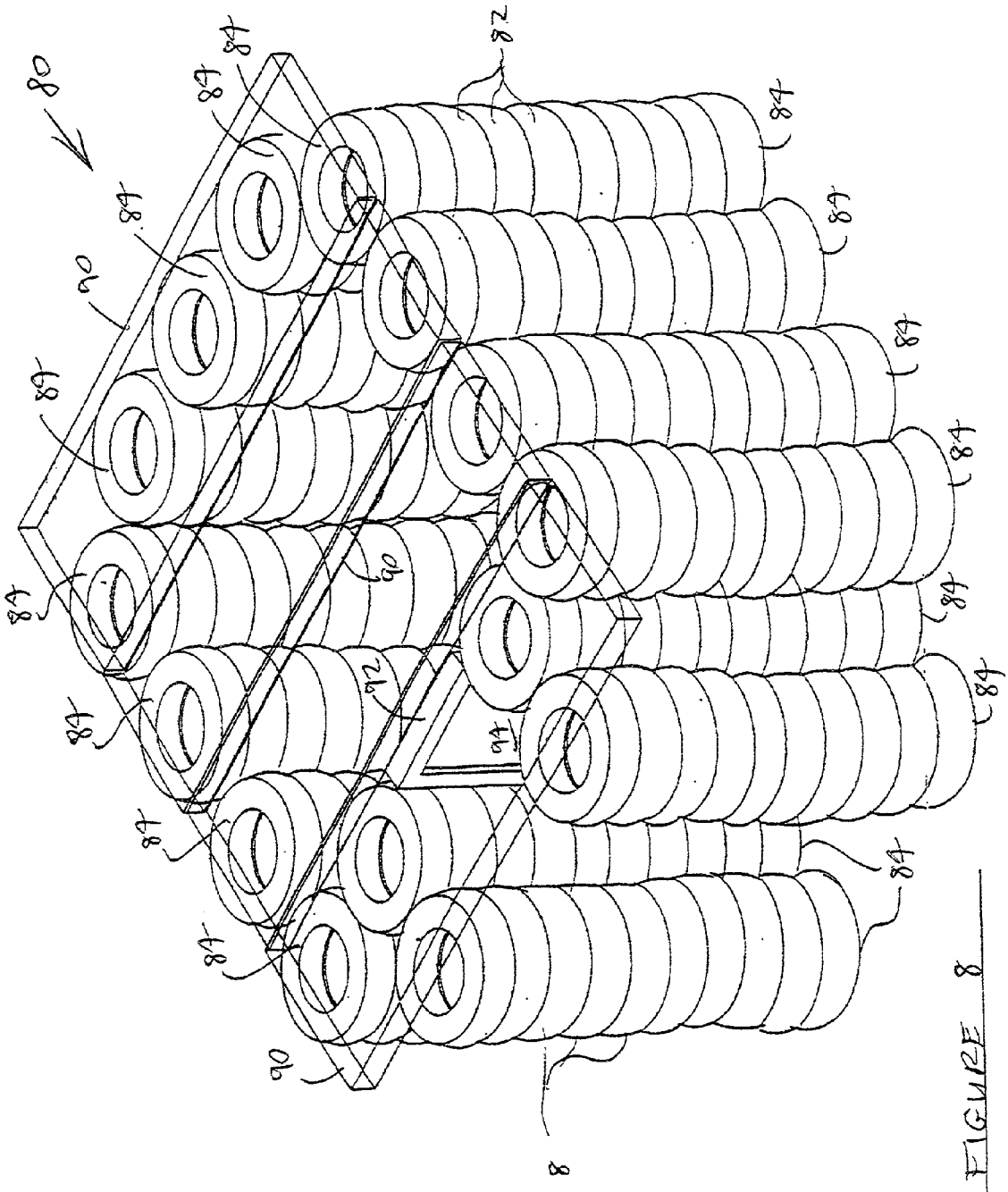

FIGURE 8

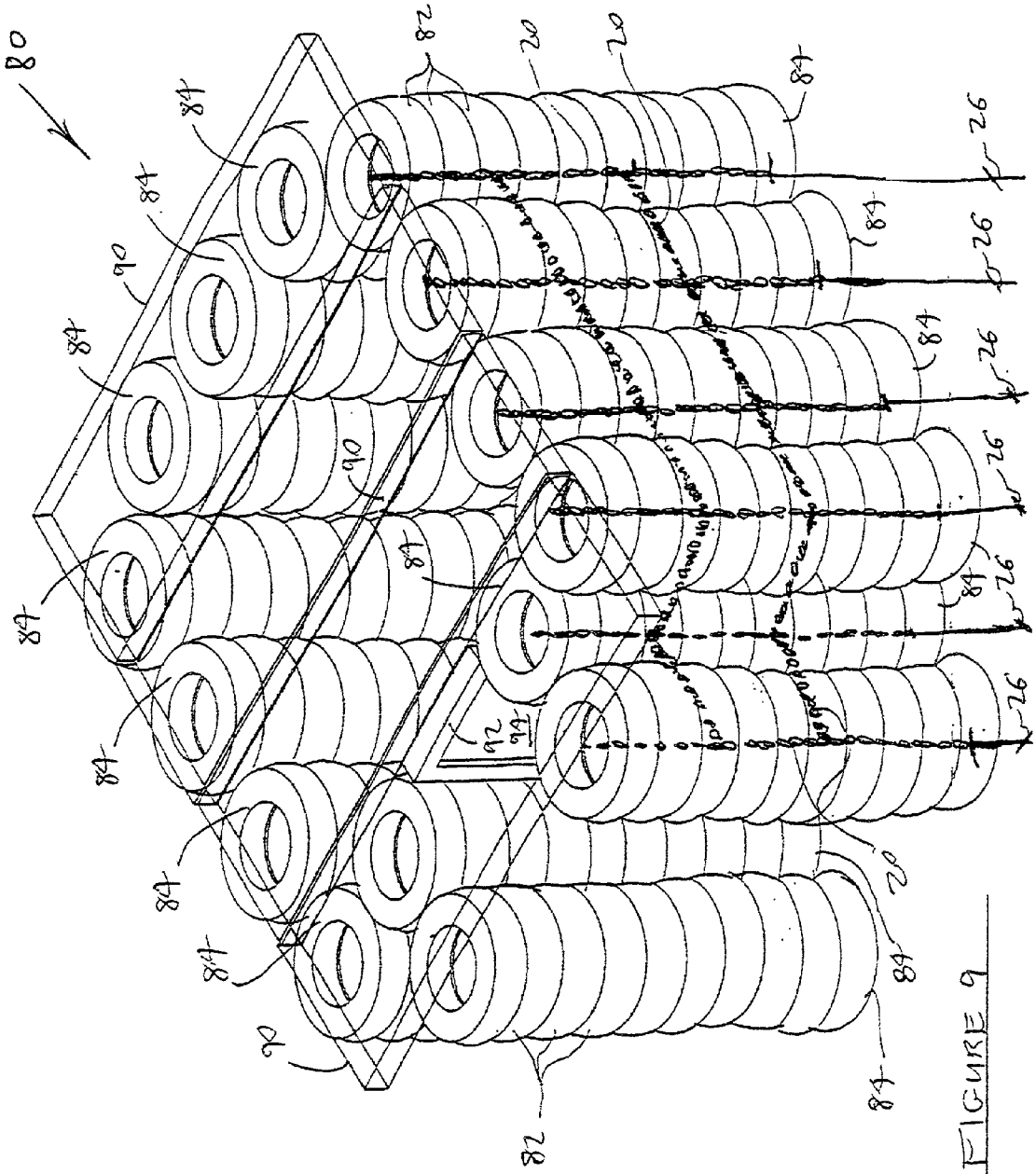

FIGURE 9

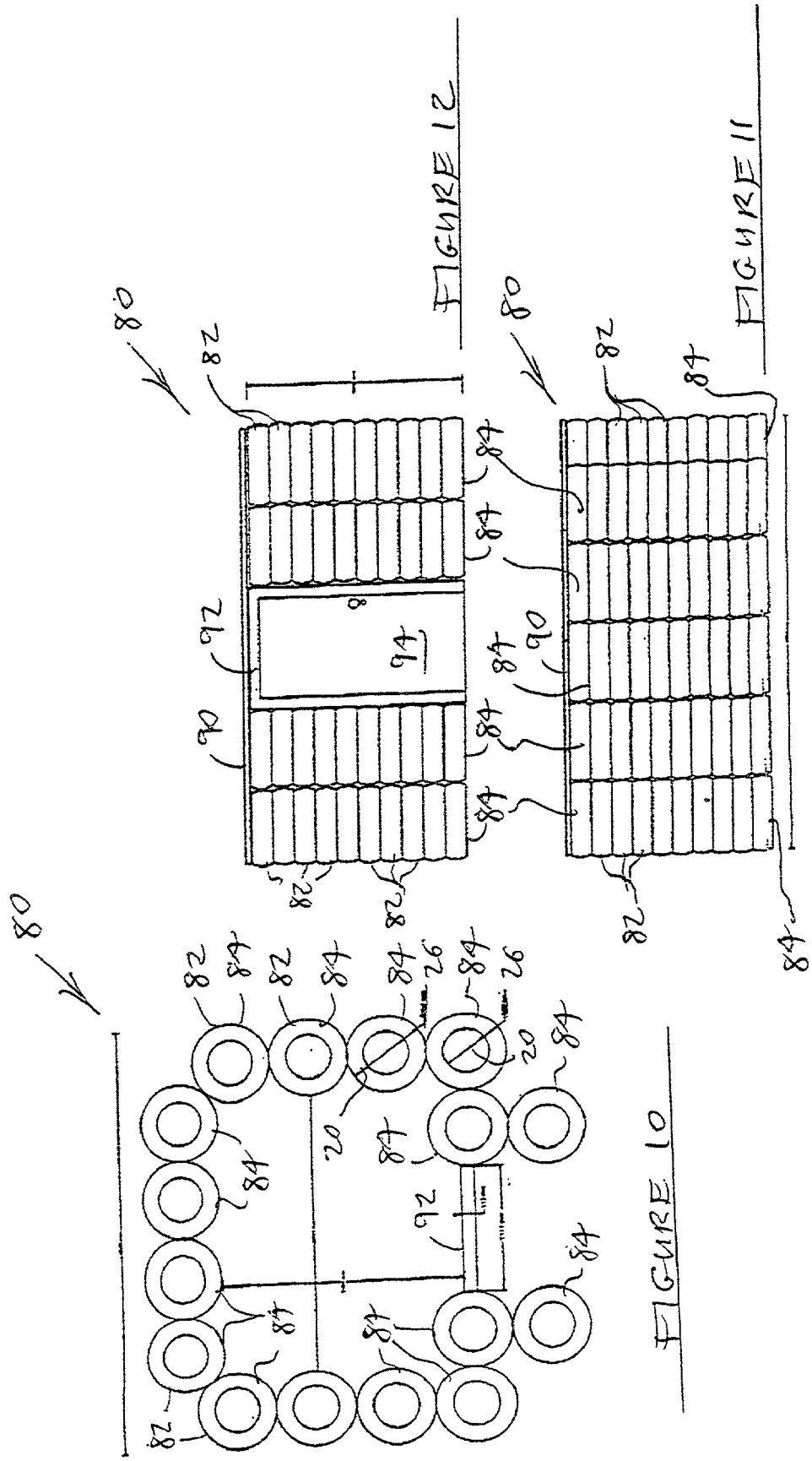

FIGURE 10

FIGURE 11

FIGURE 12

BUILDING TIE DOWN KIT FOR SECURING ROOFS, DOORS, AND WINDOWS AGAINST STORM WIND DAMAGE AND METHOD OF ASSEMBLY

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to the field of devices for securing parts of buildings against displacement and damage by storm winds. More specifically the present invention relates to a chain net formed of multilink segments of chain, the chain segments being interlinked, both laterally and in end-to-end series, by removable chain connecting mechanisms. The segmented chains are preferably of a length that makes it manageable for a single man to handle. The chain net may be assembled in place on a roof such as the roof of a house. The chain segments are placed with sufficiently close lateral spacing to define mesh sizes small enough to substantially obstruct movement of tiles or other roofing elements. At least some of the end-to-end series of chain segments are extended from the roof to anchoring points such as on the building walls, on the building foundation or on the ground, and these extended end-to-end series of chain segments are then placed in sufficient tension to secure roofing elements against dislodgement by high velocity storm winds. Whenever a house or building is mentioned in this application it also refers to mobile homes or manufactured homes.

[0003] A chain net of smaller overall dimensions is also preferably assembled within the building, across the inward faces of exterior doors such as front doors and garage doors and across the inward faces of windows. The apparatus is preferably provided as a kit including a number of multilink chain segments, a number of removable chain connecting mechanisms, wall anchoring fasteners and ground anchors, and preferably including door and window anchoring fasteners for securing doors and windows against outward movement, and assembly instructions. This kit of interlinking chains also serves to create an above the ground wind-deflecting shelter with the addition of used tires.

[0004] A method of kit assembly on a house roof is provided, including the steps of placing the chain segments into parallel first end-to-end series and joining the ends of these segments with the chain connecting mechanisms; placing lateral spanning segments between and preferably perpendicular to the several first end-to-end series to form second end-to-end series across and between the first end-to-end series to define a chain grid and joining the ends of these segments with the chain connecting mechanisms; connecting additional chain segment to the first and second end-to-end series to extend the first and second end-to-end series to building anchoring fasteners in the building or to ground anchors; creating a horizontal perimeter loop of chain segments around the building and joining the perimeter loop to the added chain segments with the chain connecting mechanisms; connecting the extended first and second end-to-end series to the building anchoring fasteners or to the ground anchors, and placing the perimeter loop of the composite net in tension with tensioning means.

[0005] 2. Description of the Prior Art

[0006] There have long been storm shutters for securing building windows and doors against storm winds. There have also been mechanisms for securing a roof against wind displacement, one example of which is disclosed in Oviedo-Reyes, U.S. Pat. No. 5,522,184, issued on Jun. 4, 1996 to the present applicant. The contents of this prior patent are incorporated by reference. Oviedo-Reyes teaches an apparatus for strengthening building structures including a net formed of cables which is secured over the roof of a house or other building and secured to anchors embedded in the ground around the building. The cable forming the net is provided in segments and these segments are interconnected. While the cable forming the net is flexible and has high tensile strength, cable by its nature is not readily connected to other cables at a variety of points along its length, so that apparatus assembly can be relatively challenging and adaptability of the apparatus to various types of structures, and to use on doors and windows, is limited.

[0007] It is thus an object of the present invention to provide a roof, door and window tie down apparatus which is formed of flexible, segmented elements which do not need to be cut and specifically of chain segments of convenient lengths for manual placement made of interlocked chain links which serve as selective connecting points for other chain segments for assembly on the building itself into a removable, custom sized and custom shaped chain net and which includes means for anchoring and tensioning the chain net against significant movement.

[0008] It is another object of the present invention to provide such a roof, door and window tie down apparatus which is flexible and is made up of elements which are easily interconnected at multiple points, unlike cables, and which is of adequate tensile strength that it can be placed in sufficient tension to resist displacement of adjacent building elements under the forces of storm winds.

[0009] It is still another object of the present invention to provide such a tie down apparatus which can be distributed to purchasers in kit form and which is universal because the number and arrangement of chain segments or pre-assembled modular chain nets can be selected for a given application, and it is an object of the present invention to provide a method of assembly of such a kit into the tie down apparatus.

[0010] Another object of the present invention is to provide such elements in combination with used old tires that are filled with dirt and concrete to form an above-ground wind deflecting shelter which can be distributed to purchasers in a kit form.

[0011] It is finally an object of the present invention to provide such a cover apparatus and kit which is compact, manually portable, made up of common and widely available and therefore inexpensive elements and which produces a sturdy and reliable tie down structure.

SUMMARY OF THE INVENTION

[0012] The present invention accomplishes the above-stated objectives, as well as others, as may be determined by a fair reading and interpretation of the entire specification.

[0013] A chain net tie down kit is provided, including several multilink chain segments; several chain connecting mechanisms for connecting the chain segments for forming a chain net matching the size and dimensions of a particular portion of a building; and several chain anchoring fasteners

for anchoring the chain net over the particular portion of a building. The several chain anchoring fasteners preferably include at least one of: a wall anchoring fastener and a ground anchor. The chain net tie down kit preferably additionally includes several door anchoring fasteners. The chain net tie down kit preferably still additionally includes at least one window shutter anchoring fasteners.

[0014] The chain segments optionally are of uniform length. The chain segments alternatively are of varied lengths. Groups of the several chain segments optionally are provided pre-assembled into modular net sections for linking together to construct a composite chain net.

[0015] A building roof and chain net assembly is provided, including a building having a building roof; and chain net formed of multilink chain segments on top of the building roof including roofing elements which are interlinked by removable chain connecting mechanisms. The chain segments preferably are interlinked in end-to-end series and are positioned on a building roof with sufficiently close lateral spacing to define chain net mesh sizes small enough to substantially obstruct movement of the roofing elements. The assembly preferably additionally includes anchor structures, where at least one of the end-to-end series of chain segments is extended from the building roof to one of the anchor structures. The anchor structures are preferably located on one of: the ground and a building wall and a building foundation. The chain segments alternatively are positioned across one of: a building door and a building window. The ends of the chain segments forming the chain net are secured to wall anchoring fasteners mounted in a building wall. The assembly optionally additionally includes a door fastener for securing to a door to anchor the chain segments to the door. The assembly optionally additionally includes a window frame fastener for securing to a window frame to anchor the chain segments to the window. The wall anchoring fasteners preferably include ring or hook screws.

[0016] A chain net kit is further provided, including several modular chain net sections; several chain connecting mechanisms for connecting the chain net sections for forming a composite chain net matching the size and dimensions of a particular portion of a building; and several chain anchoring fasteners for anchoring the chain net over the particular portion of a building.

[0017] Finally, the kit can be used to create a separate and freestanding storm shelter structure. For this variation, a number of old used tires are provided which are stacked in vertical tire columns and series of chain segments are threaded through individual tire columns and secured with chain connecting mechanisms to interconnect the columns. The chain segments extend laterally from columns and are secured to ground anchors extending into the ground. A roof is formed of a wood or metal frame structure which can be covered in any suitable roofing material, whether conventional or non-conventional. A door frame containing a hinged door is optionally inserted and secured with the chain segments between laterally spaced apart tire columns.

[0018] A method of assembly of the chain net kit including the several multilink chain segments; the several chain connecting mechanisms for connecting the chain segments for forming a chain net matching the size and dimensions of a particular portion of a building; and the several chain anchoring fasteners for anchoring the chain net over the particular portion of a building, including the steps of placing some of the chain segments into a plurality of parallel first end-to-end series; joining together adjacent ends of the chain segments forming the first end-to-end series with some the chain connecting mechanisms; placing some of the chain segments to extend between and intersect lateral the several first end-to-end series to form second end-to-end series and thus to define a chain grid; joining together adjacent ends of the chain segments forming the second end-to-end series with some of the chain connecting mechanisms; extending the first and second end-to-end series to anchor structures; connecting the first and second end-to-end series to the anchor structures; and placing at least one of: the first end-to-end series and second end-to-end series in tension with a tensioning mechanism. The method preferably includes the additional steps of placing a third end-to-end series of chain segments around the perimeter of the building to define a perimeter loop; and joining together adjacent ends of the chain segments forming the third end-to-end series with some of the chain connecting mechanisms.

[0019] A method of assembly of an alternative chain net kit including several modular chain net sections; several chain connecting mechanisms for connecting the chain net sections for forming a composite chain net matching the size and dimensions of a particular portion of a building; and several chain anchoring fasteners for anchoring the chain net over the particular portion of a building, including the steps of placing some of the modular chain net sections in a substantially contiguous array onto a building roof; joining together adjacent modular chain net sections with some the chain connecting mechanisms to define a composite chain net; and placing the composite chain net in tension with a tensioning mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] Various other objects, advantages, and features of the invention will become apparent to those skilled in the art from the following discussion taken in conjunction with the following drawings, in which:

[0021] **FIG. 1** is a perspective view of a house fitted with the preferred embodiment of the tie down apparatus assembled from the tie down kit.

[0022] **FIG. 2** is a side view of the house of **FIG. 1** showing the ground in cross-section, revealing the installed ground anchors.

[0023] **FIG. 3** is a side view of a turnbuckle tensioning mechanism.

[0024] **FIG. 4** is a side view of the preferred ground anchor, with a break in its shaft to compress the illustration.

[0025] **FIG. 5** is a plan view of the preferred tie down kit and various elements making up the kit.

[0026] **FIG. 6** is a perspective view of a building door fitted with a chain net formed from the tie down kit.

[0027] **FIG. 7** is a perspective view of a building window fitted with a chain net formed from the tie down kit.

[0028] **FIG. 8** is an upper perspective view of the used tire column building structure showing a building structure roof frame superimposed.

[0029] **FIG. 9** is a view as in **FIG. 8** showing the chain segments added to hold the tires together in columns, to hold the columns together and to secure the tire columns to ground anchors.

[0030] **FIG. 10** is a schematic top view of the building structure of **FIGS. 8 and 9**, with the roof omitted.

[0031] **FIG. 11** is a side view of the completed building structure of FIGS. **8-10**.

[0032] **FIG. 12** is a view as in **FIG. 11**, with the addition of a door frame containing a hinged door incorporated between spaced apart tire columns.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present invention in virtually any appropriately detailed structure.

[0034] Reference is now made to the drawings, wherein like characteristics and features of the present invention shown in the various FIGURES are designated by the same reference numerals.

First Preferred Embodiment

[0035] Referring to FIGS. **1-12**, a building securing apparatus **10** is disclosed including a chain net **12** formed of multilink chain segments **20** of metal or plastic which are interlinked with other chain segments **20**, both laterally and end-to-end by removable chain connecting mechanisms **30**. The chain net **12** is preferably assembled in place on a roof R such as the roof of a house.

[0036] The chain segments **20** are placed with sufficiently close lateral spacing to define net **12** mesh sizes small enough to substantially obstruct movement of tiles T or other roofing elements. Further chain segments **20** are added to at least some of the end-to-end series of chain segments **20** and are extended from the roof R to anchor means such as on the building B walls, on the building foundation F or on the ground G, and these extended end-to-end series of chain segments **20** are then placed in sufficient tension to secure outer roofing elements such as tiles T and underlying roofing elements such as plywood sheets against dislodgement by high velocity storm winds.

[0037] A chain net **12** of smaller overall dimensions is also preferably assembled within the building B, across the inward faces of exterior doors D such as front doors and garage doors and across the inward faces of windows W. Ends of chain segments **20** forming the chain net **12** are secured to wall anchoring fasteners **22** mounted in the surrounding wall, to prevent the door D or window W from opening inwardly. Door D and window W frame fasteners **24** additionally may be provided on the door or window itself to anchor net chain segments **20** to the door and window and thus to prevent the door or window from opening outwardly.

[0038] The preferred wall anchoring fasteners **22** are hook screws of well known design. The preferred door and window frame fasteners **24** are large eye screws of conventional design. The preferred ground anchor **26** is illustrated in **FIG. 4**, and shown installed in **FIG. 2**. Suitable chain link and fastener gauges and sizes are selected according to well known engineering calculations.

[0039] Apparatus **10** is preferably provided as a kit **50** including a number of multilink chain segments **20**, a number of removable chain connecting mechanisms **30**, wall anchoring fasteners **22** and ground anchors **26**, and preferably including door and window frame anchoring fasteners **24** and assembly instructions. The chain segments **20** may be of uniform length or of varied lengths. Alternatively, groups of the chain segments **20** are pre-assembled and provided in the kit **50** as several modular net sections **120** for linking edge-to-edge together during on-site assembly with the chain connecting mechanisms **30** to define a composite net **12** fashioned to match the size and dimensions of a particular roof R.

[0040] Finally, the kit can be used to create a separate and freestanding storm shelter structure **80**. See FIGS. **8-12**. For this variation, a number of old used tires **82** are provided which are stacked in vertical tire columns **84** and series of chain segments **20** are threaded through individual tire columns **84** and secured with chain connecting mechanisms **30** to interconnect tire columns **84**. Chains segments **20** extend from tire columns **84** and are secured to ground anchors **26** with chain connecting mechanisms **30**. A roof is formed of a wood or metal frame structure **90** which can be covered in any suitable roofing material, whether conventional or non-conventional. A door frame **92** containing a hinged door **94** may be inserted and secured with chain segments **20** between laterally spaced apart tire columns **84**. See **FIGS. 8, 9, 10** and **12**.

Method

[0041] In practicing the invention, the following method may be used. A method of kit **50** assembly on a house roof R from the version of the kit **50** including individual chain segments **20** is provided, including the steps of placing the chain segments **20** into parallel first end-to-end series **52** and joining the ends of these segments **20** with the chain connecting mechanisms **30**; placing lateral spanning segments between and preferably perpendicular to the several first end-to-end series **52** to form second end-to-end series **54** across and between the first end-to-end series **52** to define a chain grid and joining the chain second end-to-end series **54** to first end-to-end series **52** with connecting mechanisms **30**; extending the first and second end-to-end series **52** and **54** respectively to building anchoring fasteners **22** or **24** in the building or to ground anchors **26**; connecting the extended first and second end-to-end series **52** and **54** to the building anchoring fasteners **22** or **24** or to the ground anchors **26**, and placing the composite net **12** in tension with tensioning means **60**. The tensioning means **60** may be a winch, or a device known as a COME-ALONG, or a turnbuckle, or a ratchet or a calibrated tensioner or any device to provide tension to the chains. Preferred additional steps include placing a third end-to-end series of chain segments around the perimeter of the building to define a perimeter loop **70**; and joining together adjacent ends of the chain segments forming the third end-to-end series with some of the chain connecting mechanisms.

[0042] A further method is provided of assembly of the alternative kit including the modular chain net sections **120**, including the steps of placing some of the modular chain net sections **120** in a substantially contiguous array onto a building roof R; joining together adjacent modular chain net sections **120** with some the chain connecting mechanisms **30** to define a composite chain net **12**; and placing the composite chain net **12** in tension with tensioning means **60**. The provision of modular chain net sections **120** is believed to increase speed of composite net **12** assembly.

[0043] While the invention has been described, disclosed, illustrated and shown in various terms or certain embodiments or modifications which it has assumed in practice, the scope of the invention is not intended to be, nor should it be deemed to be, limited thereby and such other modifications or embodiments as may be suggested by the teachings herein are particularly reserved especially as they fall within the breadth and scope of the claims here appended.

I claim as my invention:

1. A chain net tie down kit, comprising:

a plurality of multilink chain segments;

a plurality of chain connecting mechanisms for connecting said chain segments for forming a chain net substantially matching the size and dimensions of a particular portion of a building;

and a plurality of chain anchoring fasteners for anchoring said chain net over the particular portion of a building.

2. The chain net tie down kit of claim 1, wherein said plurality of chain anchoring fasteners comprise at least one of: a wall anchoring fastener and a ground anchor.

3. The chain net tie down kit of claim 1, additionally comprising a plurality of door anchoring fasteners.

4. The chain net tie down kit of claim 1, additionally comprising a plurality of window frame anchoring fasteners.

5. The chain net tie down kit of claim 1, wherein said chain segments are of uniform length.

6. The chain net tie down kit of claim 1, wherein said chain segments are of varied lengths.

7. The chain net tie down kit of claim 1, wherein groups of said plurality of chain segments are provided pre-assembled into modular net sections for linking together to construct a composite chain net.

8. The chain net tie down kit of claim 1, additionally comprising a plurality of vehicle tires;

such that said plurality of vehicle tires can be placed in stacks defining building columns and secured together with said plurality of chains to form the walls of an above-ground wind deflecting shelter wherein said chains are secured to a plurality of said ground anchor.

9. A building roof and chain net assembly, comprising:

a building having a building roof;

and chain net formed of multilink chain segments on top of said building roof which are interlinked by removable chain connecting mechanisms.

10. The assembly of claim 9, wherein said building roof comprises roofing elements and wherein said chain segments are interlinked in end-to-end series and are positioned on a building roof with sufficiently close lateral spacing to define chain net mesh sizes small enough to substantially obstruct movement of roofing elements.

11. The assembly of claim 10, additionally comprising anchor means, wherein at least one of said end-to-end series of chain segments is extended from the building roof to anchor means.

12. The assembly of claim 11, wherein said anchor means comprises an anchoring structure located on one of: the ground and a building wall and a building foundation.

13. The assembly of claim 9, wherein said chain segments are positioned across one of: a building door and a building window.

14. The assembly of claim 13, wherein said ends of said chain segments forming said chain net are secured to wall anchoring fasteners mounted in a building wall.

15. The assembly of claim 14, additionally comprising a door fastener for securing to a door to anchor said chain segments to the door.

16. The assembly of claim 14, additionally comprising a window frame fastener for securing to a window frame to anchor said chain segments to the window.

17. The assembly of claim 14, wherein said wall anchoring fasteners comprise hook screws.

18. A chain net kit, comprising:

plurality of modular chain net sections;

a plurality of chain connecting mechanisms for connecting said chain net sections for forming a composite chain net substantially matching the size and dimensions of a particular portion of a building;

and a plurality of chain anchoring fasteners for anchoring said chain net over the particular portion of a building.

19. A method of assembly of a chain net kit comprising a plurality of multilink chain segments; a plurality of chain connecting mechanisms for connecting said chain segments for forming a chain net substantially matching the size and dimensions of a particular portion of a building; and a plurality of chain anchoring fasteners for anchoring said chain net over the particular portion of a building, comprising the steps of:

placing some of the chain segments into a plurality of parallel first end-to-end series;

joining together adjacent ends of the chain segments forming the first end to end series with some the chain connecting mechanisms;

placing some of the chain segments to extend between and intersect lateral said several first end-to-end series to form second end-to-end series and thus to define a chain grid;

joining together adjacent ends of the chain segments forming the second end-to-end series with some of the chain connecting mechanisms;

extending the first and second end-to-end series to anchor means;

connecting the first and second end-to-end series to the anchor means;

and placing at least one of: the first end-to-end series and second end-to-end series in tension with tensioning means.

20. The method of claim 19, comprising the additional steps of:

placing a third end-to-end series of chain segments around the perimeter of the building to define a perimeter loop;

and joining together adjacent ends of the chain segments forming the third end-to-end series with some of the chain connecting mechanisms.

21. A method of assembly of a chain net kit comprising a plurality of modular chain net sections; a plurality of chain connecting mechanisms for connecting said chain net sections for forming a composite chain net substantially matching the size and dimensions of a particular portion of a building; and a plurality of chain anchoring fasteners for anchoring said chain net over the particular portion of a building, comprising the steps of:

placing some of the modular chain net sections in a substantially contiguous array onto a building roof;

joining together adjacent modular chain net sections with some the chain connecting mechanisms to define a composite chain net;

and placing the composite chain net in tension with tensioning means.

* * * * *