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(54) **BACKUP WALL REINFORCEMENT WITH T-TYPE SIDERAIL**

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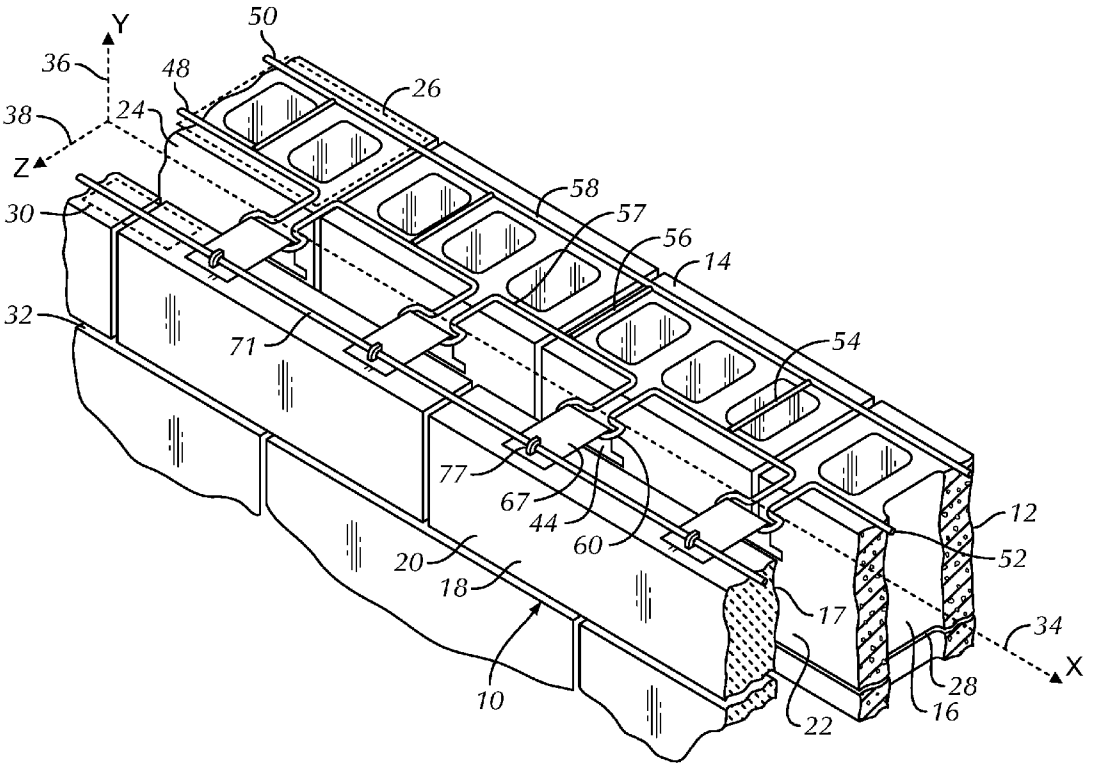
(57) **ABSTRACT**

A backup wall reinforcement with T-type siderail anchoring system is described for use in masonry cavity walls. The reinforcement and integral anchor is hybrid device installed within the backup wall and interlocked with novel veneer ties. The novel veneer ties are manually connected through swinging or twisting the veneer ties until the veneer ties are interlocked with the anchor. Once interlocked, lateral and vertical veneer tie movement is limited strengthening the cavity wall structure. The inclusion of a reinforcement wire within the veneer ties and the exterior wall provides a seismic structure.



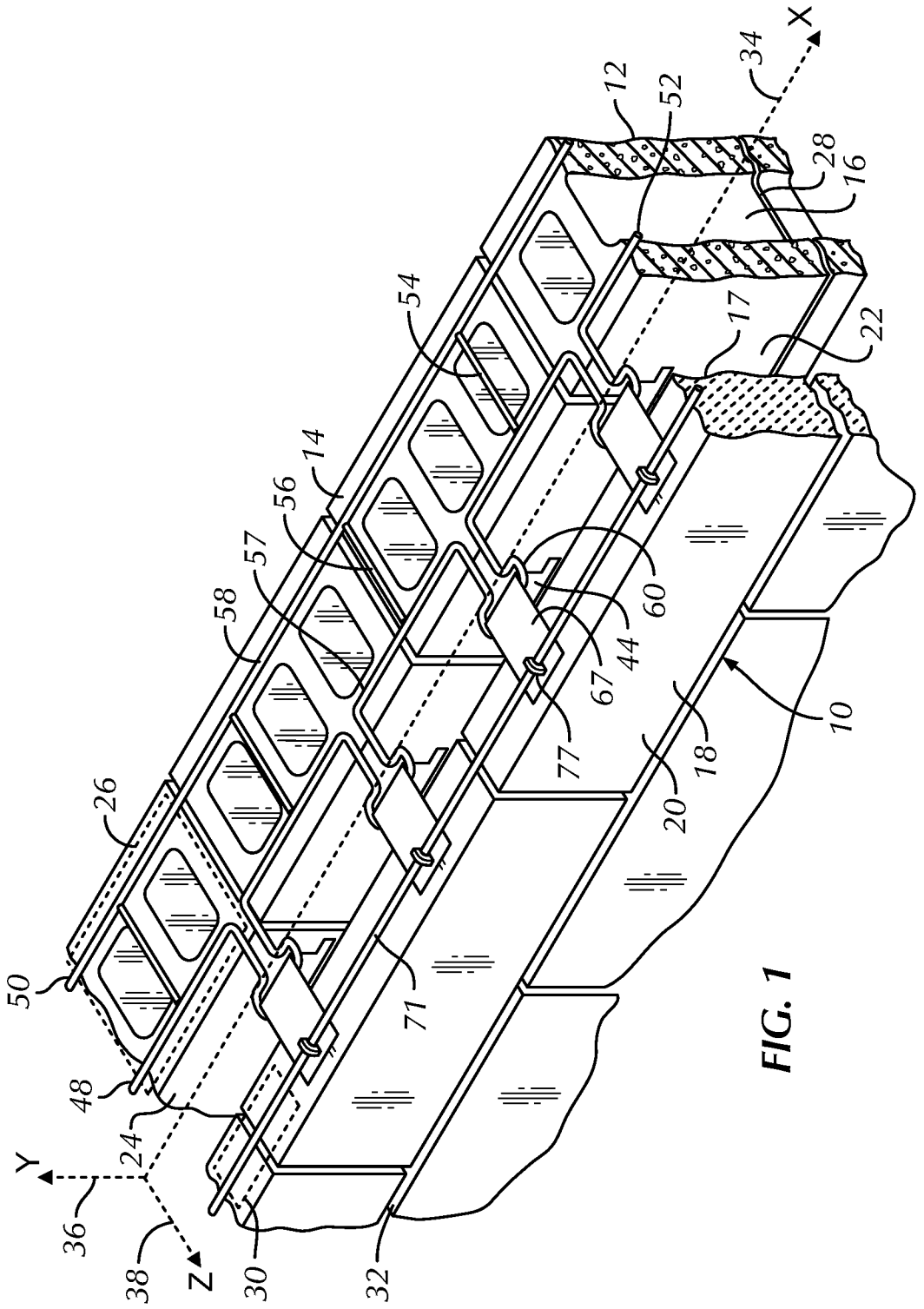

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FIG. 1

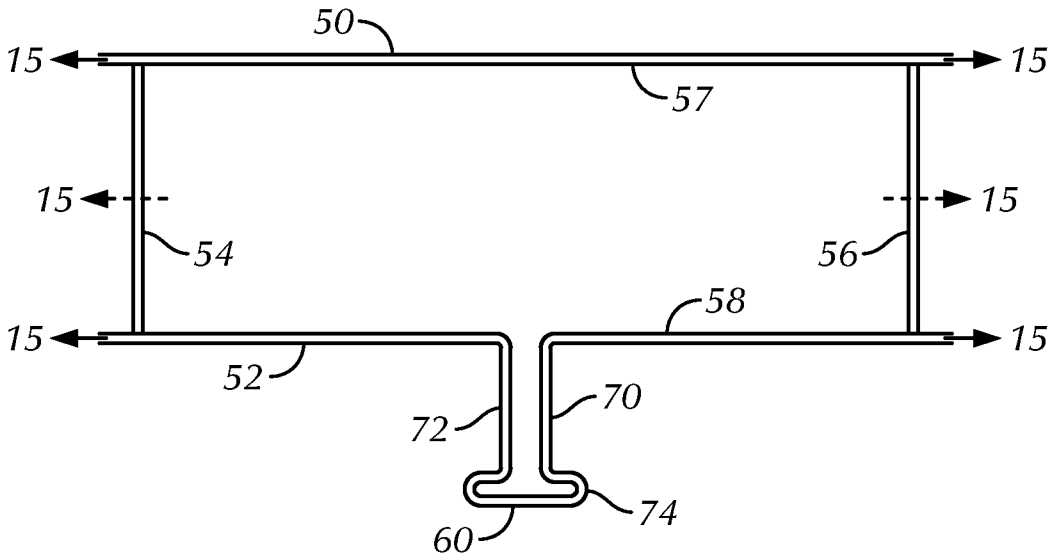

FIG. 2

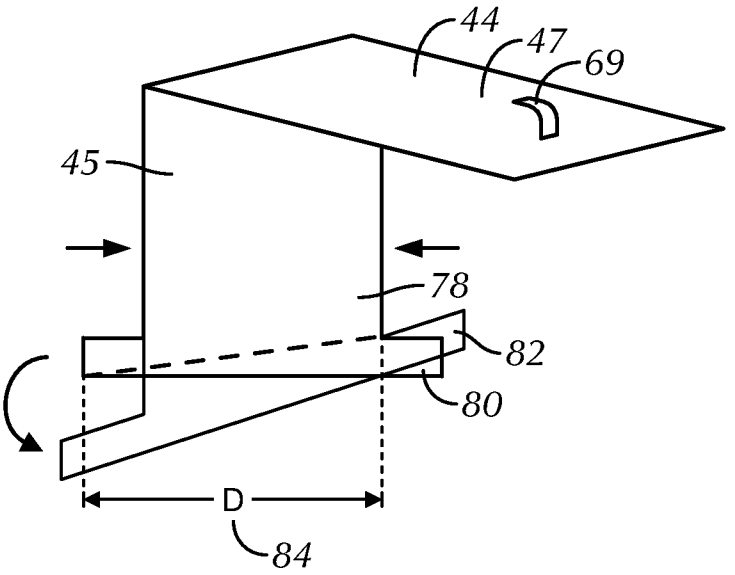

FIG. 3

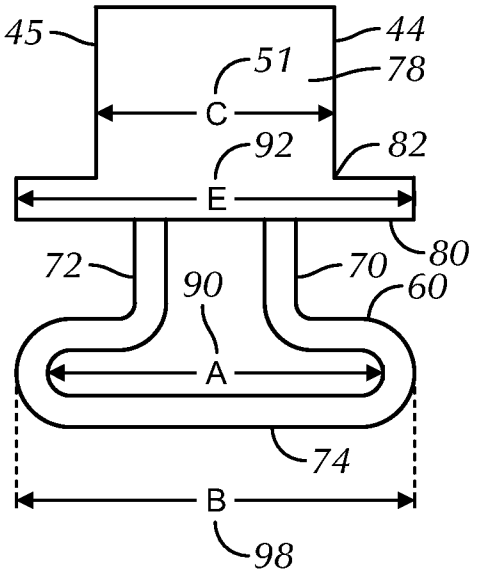

FIG. 4

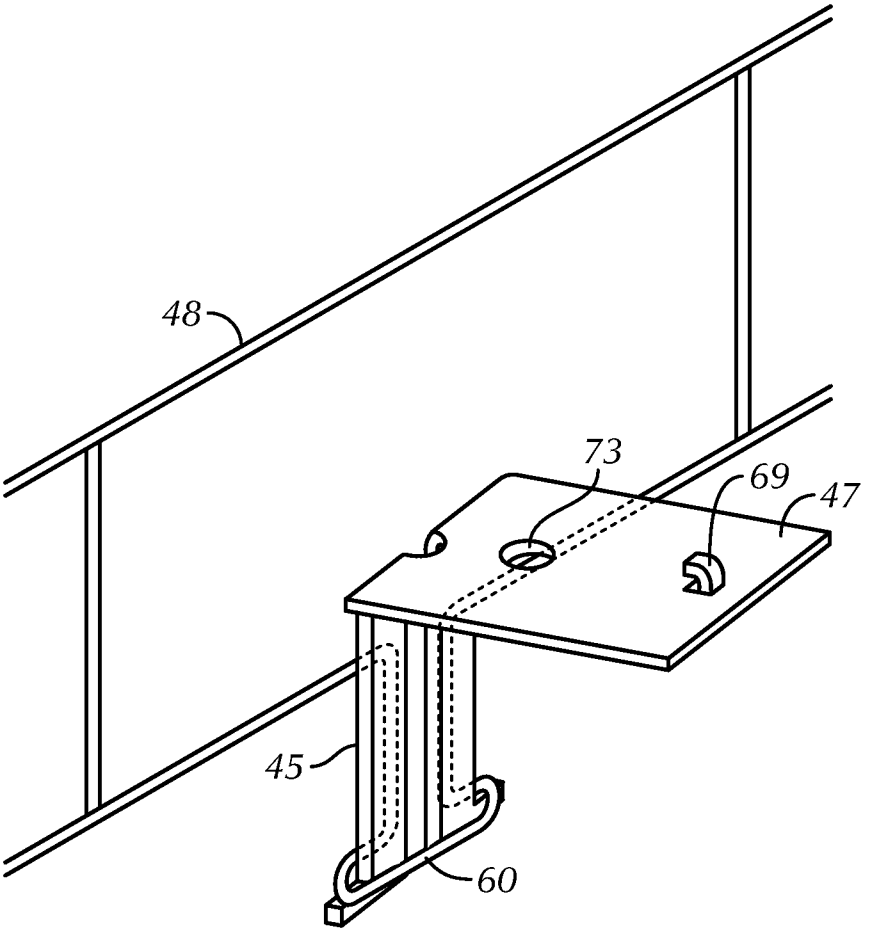

FIG. 5

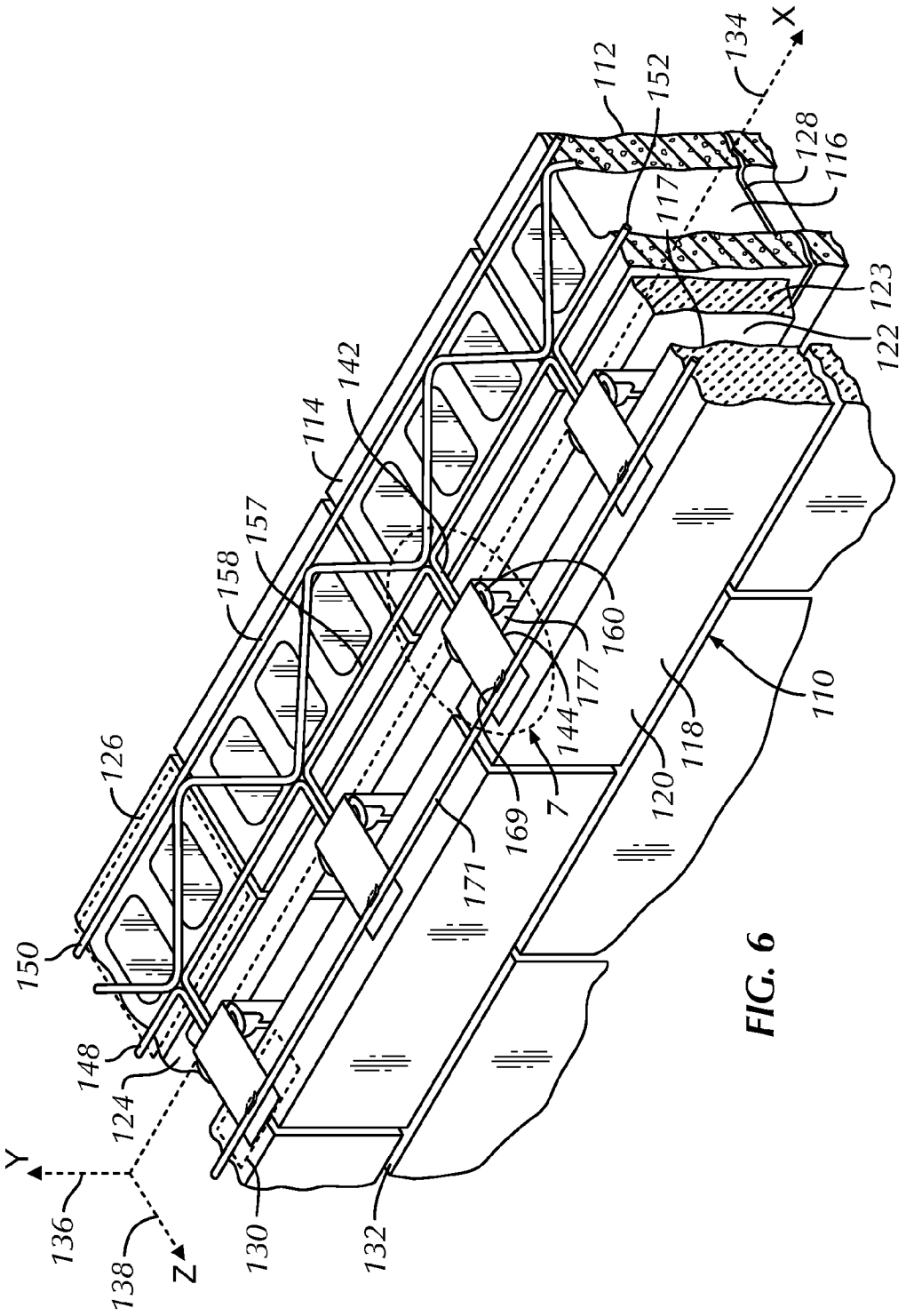
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FIG. 6

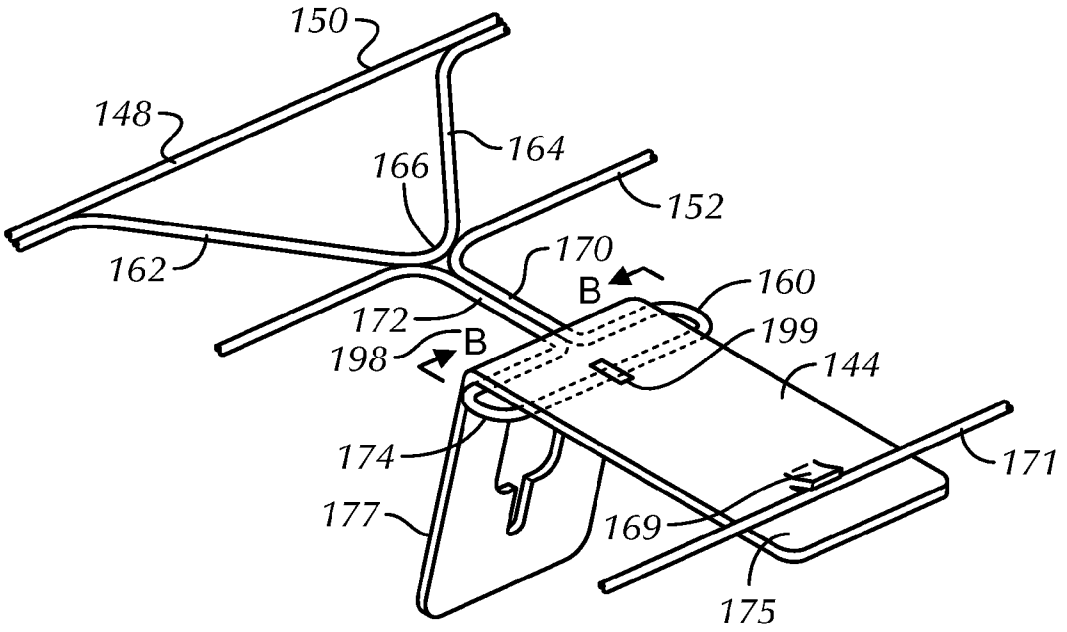
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FIG. 7

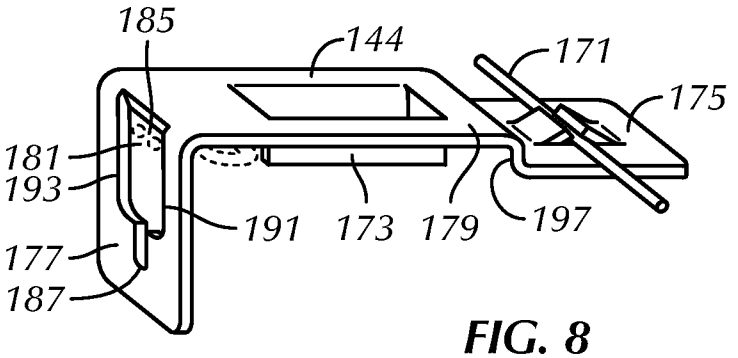

FIG. 8

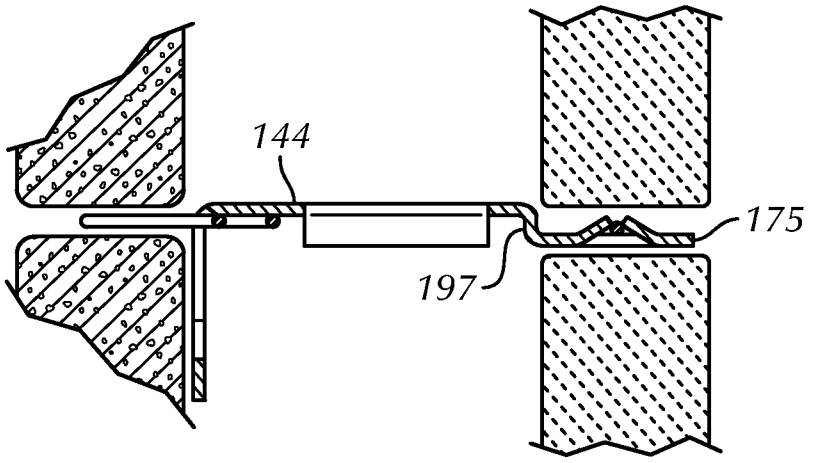

FIG. 9

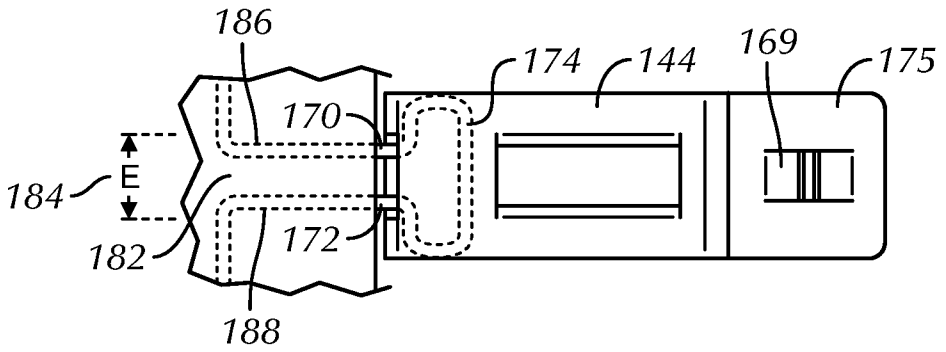

FIG. 10

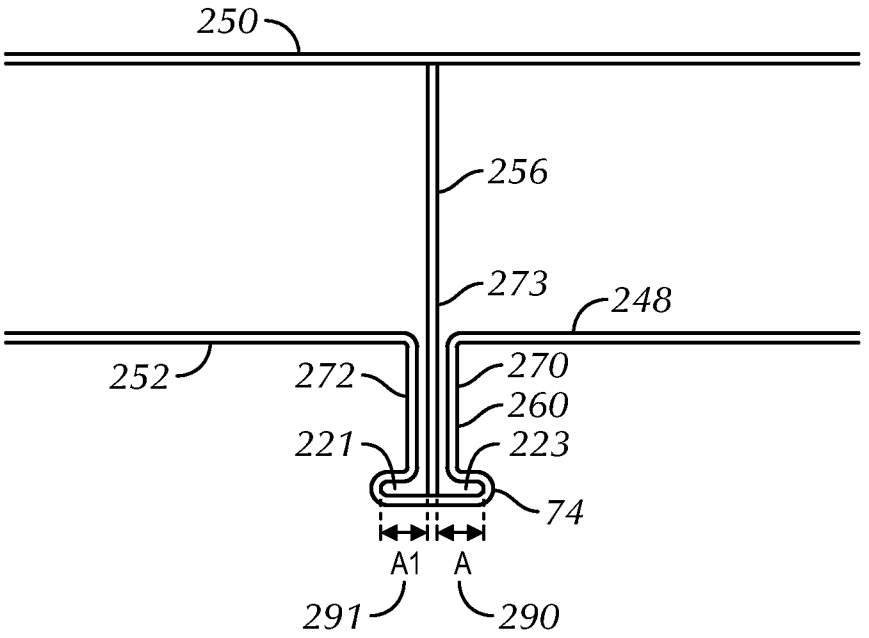
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FIG. 11

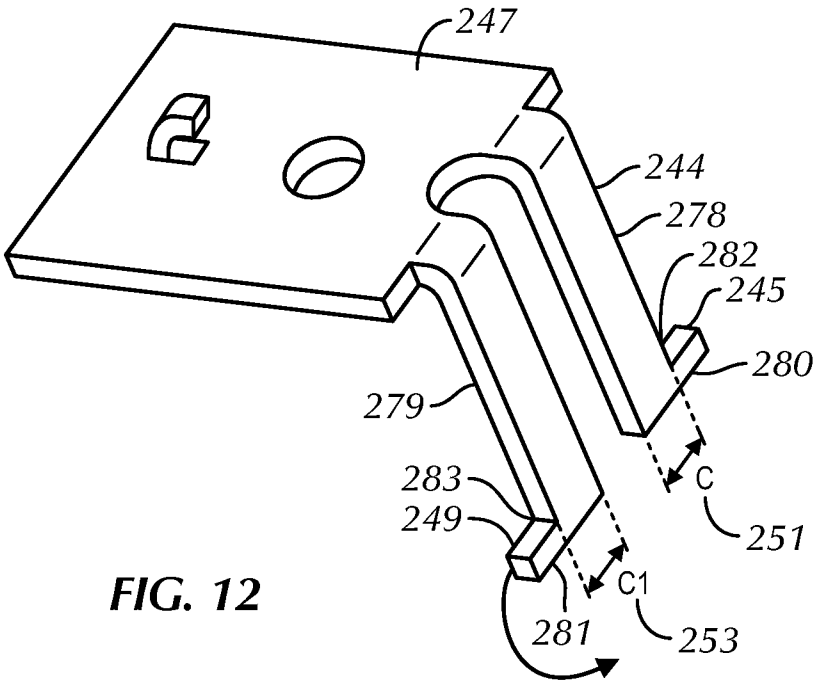
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FIG. 12

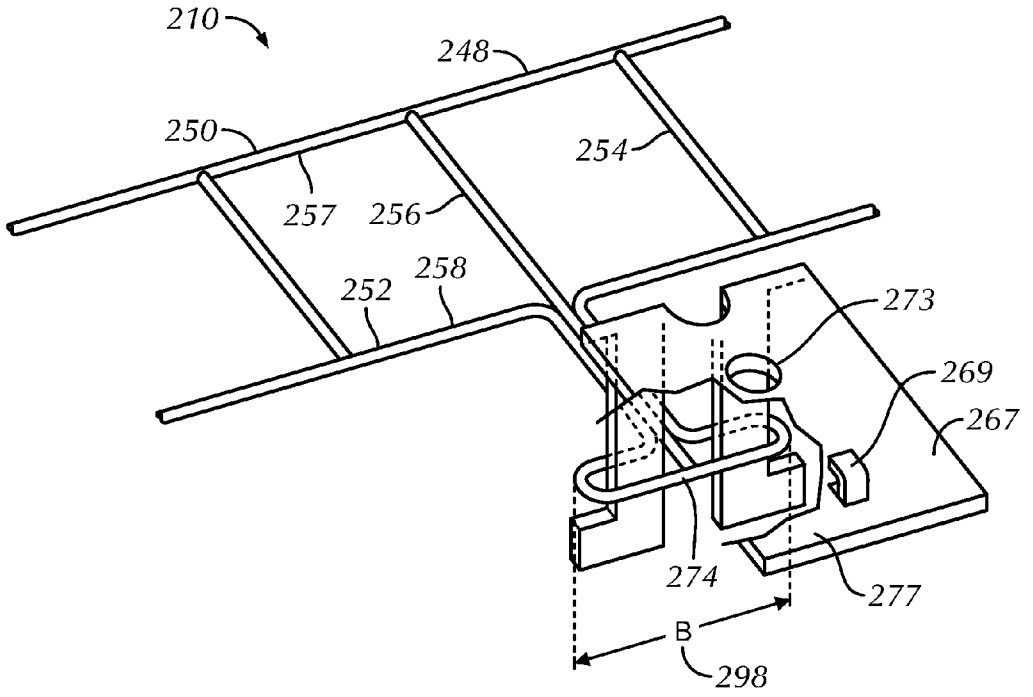

FIG. 13

BACKUP WALL REINFORCEMENT WITH T-TYPE SIDERAIL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] This invention relates to reinforcement and anchor assemblies for use in masonry backup walls and, in particular, cavity wall constructs with backup and veneer walls that require superior anchoring properties. The backup wall reinforcement is a hybrid anchoring system which includes a reinforcement with an integrated anchor for connection to an interlocking veneer tie which provides a 3-axis restraint system, limiting movement and exterior wall displacement.

[0003] 2. Description of the Prior Art

[0004] Masonry, the building of structures from individual units laid in and bound together by mortar, is commonly used for the construction of buildings. Such widespread use is the result of the high durability, compressive strength, thermal mass and heat resistance of the masonry building materials. Because masonry construction requires extensive manual labor and individual building materials, the quality of the masonry construction is directly dependent on the type of materials and devices used and the workmanship of the mason.

[0005] In recent years, attention has been paid to wall reinforcement for areas that are subjected to external forces such as high winds and seismic activity. To address a difficulty with masonry construction, weakness of the horizontal mortar or bed joints that bond the masonry units together, well-known devices such as ladder and truss reinforcements are used to augment the tensile strength of the horizontal mortar joints. Any weakness in the bed joints resulting from low tensile strength mortar, has been generally addressed by providing mortar joint reinforcement for structural stability. The ladder and truss reinforcements have been historically used to reduce cracking that arises from thermal stresses, to increase lateral flexural strength, and to enhance the elasticity and performance of masonry walls under various stresses.

[0006] Further seismic protection is achieved through the use of a continuous wire in the veneer masonry walls. In the past, there have been investigations relating to the effects of various forces, particularly lateral forces, upon brick veneer construction having wire formative anchors embedded in the mortar joint of anchored veneer walls. The seismic aspect of these investigations are referenced in the first-named inventor's prior patents, namely, U.S. Pat. Nos. 4,875,319 and 5,408,798. Besides earthquake protection, the failure of several high-rise buildings to withstand wind and other lateral forces has resulted in the incorporation of a requirement for continuous wire reinforcement in the Uniform Building Code provisions.

[0007] The inventors' patents and their assignee's product line include masonry accessories, namely, ladder and truss reinforcements, wall anchors, veneer ties, masonry flashing and related items for cavity walls. These products, which are sold under the trademarks of Lox All, DW-10X, X-seal, and FlexFlash, are manufactured by Hohmann & Barnard, Inc., Hauppauge, N.Y. 11788 ("H&B"), a unit of MiTek Industres, Inc., a Berkshire Hathaway subsidiary. The products have become widely accepted in the construction industry and the inventors have gained particular insight into the technological needs of the marketplace.

[0008] Recently, there have been significant shifts in public sector building specifications which have resulted in architects and architectural engineers requiring larger and larger cavities in the exterior cavity walls of public buildings. These requirements are imposed without corresponding decreases in wind shear and seismic resistance levels or increases in mortar bed joint height. Thus, the wall anchors needed are restricted to occupying the same ⅜ inch bed joint height in the inner and outer wythes. Thus, the veneer facing material is tied down over a span of two or more times that which had previously been experienced. Exemplary of the public sector building specification is that of the Energy Code Requirement, Boston, Mass. (See Chapter 13 of 780 CMR, Seventh Edition). This Code sets forth insulation R-values well in excess of prior editions and evokes an engineering response opting for thicker insulation and correspondingly larger cavities.

[0009] Numerous improvements to masonry wall reinforcement have been made by H&B. In 1976, Hala and Schwalberg of H&B, received U.S. Pat. No. 3,964,226 for an adjustable wall-tie reinforcing system which joined reinforcements in inner and outer wythes with an attached eye and pintle structure. During the period when the Uniform Building Code developed joint reinforcement specifications, Hohmann, et al., received U.S. Pat. No. 5,454,200 issued Oct. 3, 1995 and U.S. Pat. No. 6,279,283 issued Aug. 28, 2001. Examples of additional H&B inventions which resolve complex issues relating to cavity wall construction include U.S. Pat. Nos. 6,279,283, 6,668,505, 6,789,365, 6,851,239, and 7,325,366. These patents provide veneer anchoring systems for masonry walls which include reinforcement for cavity walls and have received widespread usage in the industry. However, none of these devices offers a hybrid backup wall reinforcement and anchor that when combined with the disclosed veneer tie provides reinforcement and 3-axis displacement protection.

[0010] Basic ladder and truss reinforcements are well known in the art. Exemplary of such basic reinforcements are in a patent to Stephen Priest, Jr., U.S. Pat. No. 903,000 issued Nov. 3, 1908, entitled "Wall Tie," which provides a reinforcing ladder device constructed of twisted wires with one side of the ladder device embedded in the outer wythe and the other, in the inner wythe. Similarly, H. Spaight, U.S. Pat. No. 2,300,181 issued Oct. 27, 1942, entitled "Means for Constructing Buildings," teaches a truss shaped reinforcement device for embedment in either one wythe or in cavity walls in both withes. More recently, W. Smith in U.S. Pat. No. 3,183,628 issued May 18, 1965, entitled "Masonry Wall Reinforcing Means," describes an improvement of the Spaight invention by teaching truss and ladder reinforcements having grooves or bosses on the parallel side wires to increase the mortar bonding therewith. The placement of one of the aforementioned devices in the horizontal mortar joints enhances the tensile strength of the horizontal joints.

[0011] The present invention employs a novel hybrid device that combines an inner wythe or backup wall with a wall anchor that provides a 3-axis restraint system, which measurably improves the stability of the overall cavity wall structure. The backup wall reinforcement anchoring system includes an integrated anchor that ensures an unbroken connection between these two essential components and, by integrating the two elements reduces the number of components at the job site. The integrated anchor is constructed in a manner to tightly receive a veneer tie and limit movement of the tie within the anchor. The connection of the anchor and veneer tie is accomplished without tools through a swinging

or twisting motion. Limiting veneer tie movement protects against movement and shifting of the exterior wall, which is a cause of structural damage. Further seismic protection is provided through the attachment of a reinforcement wire to the veneer tie and set within the exterior wall. The integrated reinforcement and anchor assembly reduces the number of bits and pieces brought to the job site and manual twist-and-drop interengagement simplifies installation.

[0012] In preparing for this application the below-mentioned patents have become known to the inventors hereof. The following patents, not previously discussed, are believed to be relevant:

Patent	Inventor	Issue Date
3,377,764	Storch	Apr. 16, 1968
4,869,038	Catani	Sep. 26, 1989
5,392,581	Hatzinikolas et al.	Feb. 28, 1995
6,351,922	Burns et al.	Mar. 5, 2002
6,735,915	Johnson, III	May 18, 2004
7,152,382	Johnson, III	Dec. 26, 2006

[0013] U.S. Pat. No. 3,377,764—D. Storch—Issued Apr. 16, 1968 Discloses a bent wire, tie-type anchor for embedment in a facing exterior wythe engaging with a loop attached to a straight wire run in a backup interior wythe.

[0014] U.S. Pat. No. 4,869,038—M. J. Catani—Issued Sep. 26, 1989 Discloses a veneer wall anchor system having in the interior wythe a truss-type anchor, similar to Hala et al. '226, supra, but with horizontal sheetmetal extensions. The extensions are interlocked with bent wire pintle-type wall ties that are embedded within the exterior wythe.

[0015] U.S. Pat. No. 5,392,581—Hatzinikolas et al.—Issued Feb. 28, 1995 Discloses a cavity-wall anchor having a conventional tie wire for embedment in the brick veneer and an L-shaped sheetmetal bracket for mounting vertically between side-by-side blocks and horizontally atop a course of blocks. The bracket has an opening which is vertically disposed and protrudes into the cavity. The opening provides for a vertically adjustable anchor.

[0016] U.S. Pat. No. 6,351,922—Burns et al.—Issued Mar. 5, 2002 Discloses an adjustable wall tie for cavity walls with a tension anchor and a connected J-shaped single-ended hook.

[0017] U.S. Pat. Nos. 6,735,915 and 7,152,381—Johnson, III—Issued May 18, 2004 and Dec. 26, 2006, respectively Discloses a masonry anchoring system for connecting two spaced apart masonry walls. The anchor includes a ladder or truss type support for positioning on top of a mortar joint and a bracket that lies in the space between the two walls. The bracket is designed to receive a connecting member to connect the two walls.

[0018] Accordingly, while several distinct devices were developed to provide a connection between the backup and exterior walls, the current state of the art does not fulfill the need for a hybrid anchor and reinforcement assembly that provides a 3-axis restraint system. As described hereinbelow, the present invention provides a manually assembled, integrated backup wall and anchor assembly with a veneer tie connector that limits movement in x-, y- and z-axes, thereby simplifying installation and providing a useful and novel solution to the aforementioned difficulties.

SUMMARY

[0019] The present invention is a hybrid anchoring system for cavity walls. The reinforcement is a wire formative with side and intermediate wires disposed in the backup wall. The reinforcement is constructed in a ladder or truss configuration and contains an anchor integral therewith formed from a side wire configured to extend into the wall cavity. The integrated anchor has leg portions that extend to form a veneer receptor. The veneer receptor has a single opening or alternatively two openings. The openings are formed completely from the side wire or from a combination of the side wire and an intermediate wire.

[0020] The veneer tie or veneer anchor is a metal stamping designed to connect with and be secured within the anchor and the exterior wall bed joint. The veneer tie has a single leg for insertion within the single-opening anchor or two legs for insertion within the two chamber anchor. The veneer tie contains an insertion portion with lower portions continuous with the upper portions that lock the veneer tie within the anchor preventing veneer displacement. The veneer tie further includes a free end portion that spans the cavity and is inserted within the bed joint of the exterior wall. The veneer tie is constructed to allow the veneer tie to manually swing into the opening or chambers without the use of tools. For greater seismic protection, the veneer tie is notched to secure a reinforcement wire within the veneer tie and the bed joint of the exterior wall. For greater displacement protection, the veneer tie section that spans the cavity is offset where the tie section abuts the interior of the exterior wall.

[0021] An alternative veneer tie or veneer anchor is a metal stamping designed to connect with and be secured over the anchor and within the exterior wall bed joint. The alternative veneer tie contains a slot in the connector portion that is dimensioned to allow the veneer tie to be placed over the anchor and manually rotated or twisted 90 degrees for securement on the anchor. The veneer tie optionally contains a securement notch that snap fits onto the wall anchor. Upon securement on the anchor, the free end of the veneer tie spans the cavity and inserted within the bed joint of the exterior wall. For greater seismic protection, the veneer tie is notched to secure a reinforcement wire within the veneer tie and the bed joint of the exterior wall. For greater displacement protection, the veneer tie section that spans the cavity is offset where the tie section abuts the interior of the exterior wall.

[0022] It is an object of the present invention to provide a manually assembled, integrated reinforcement and anchoring system for masonry backup walls.

[0023] It is another object of the present invention to provide an anchoring system that provides a 3-axis restraint system to limit veneer displacement.

[0024] It is a further object of the present invention to provide an anchoring system comprising a limited number of component parts that are economical of manufacture resulting in a low unit cost.

[0025] It is yet another object of the present invention to provide an anchoring system which is easy to install and meets seismic and shear resistance requirements.

[0026] It is another object of the present invention to provide labor-saving devices to simplify seismic-type installations of brick and stone veneer and the securement thereof to a backup wall.

[0027] It is a feature of the present invention that the anchor, the integrated wall anchor and wall reinforcement are dimen-

sioned so that, when inserted into the respective mortar layers, the mortar thereof can flow around the wall-anchor-to-reinforcement-wire joint.

[0028] It is a further feature of the present invention that the anchor is formed from the backup wall reinforcement side rails to accept a veneer tie.

[0029] It is another feature of the present invention that the anchor is formed to interengage with the veneer tie to provide a 3-axis restraint system.

[0030] Other objects and features of the invention will become apparent upon review of the drawings and the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] In the following drawings, the same parts in the various views are afforded the same reference designators.

[0032] FIG. **1** is a perspective view of a first embodiment of a backup wall reinforcement with a T-type siderail anchoring system of this invention, including a ladder reinforcement with integral anchor connected to a veneer tie and reinforcement wire and shows a cavity wall with a backup wall of masonry block, and a facing wall of brick veneer;

[0033] FIG. **2** is a top plan view of the ladder reinforcement with integral anchor of FIG. **1**;

[0034] FIG. **3** is a perspective view of the veneer tie of FIG. **1**;

[0035] FIG. **4** is a top plan view of the integral anchor and a side view of the veneer tie of FIG. **1**;

[0036] FIG. **5** is a perspective view of the ladder reinforcement with integral anchor of FIG. **1** with the veneer tie being swung into the anchor;

[0037] FIG. **6** is a perspective view of a second embodiment of a backup wall reinforcement with T-type siderail system of this invention including a truss reinforcement with integral anchor connected to a veneer anchor, shown in an enlarged view, and reinforcement wire and shows a cavity wall with a backup wall of masonry block, insulation, and a facing wall of brick veneer;

[0038] FIG. **7** is perspective view of the truss reinforcement with integral anchor of FIG. **6** with a veneer tie interlocked with the anchor and connected to a reinforcement wire;

[0039] FIG. **8** is a perspective view of the veneer tie of FIG. **6** with a reinforcement wire set therein;

[0040] FIG. **9** is a side view of the veneer tie and reinforcement wire of FIG. **8** disposed within a cavity wall structure;

[0041] FIG. **10** is a top plan view of the veneer tie of FIG. **8** interlocked with an anchor;

[0042] FIG. **11** is a top plan view of a third embodiment of a backup wall reinforcement with T-type siderail system of this invention, including a ladder reinforcement with integral anchor;

[0043] FIG. **12** is a perspective view of the veneer tie for use with the ladder reinforcement with integral anchor of FIG. **11**; and

[0044] FIG. **13** is a perspective view of the ladder reinforcement with integral anchor of FIG. **11** with the veneer tie of FIG. **12** being swung into the anchor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0045] Before entering into the detailed Description of the Preferred Embodiments, several terms are defined, which terms will be revisited later, when some relevant analytical issues are discussed. As previously discussed, stronger joint reinforcements are required in the inner wythe or backup wall to support the stresses imparted by anchoring the exterior wall or veneer. As described hereinbelow, this is accomplished while still maintaining building code requirements for masonry structures, including the mortar bed joint height specification—most commonly 0.375 inches. Although thicker gauge wire formatives are used when required for greater strength, it is still desirable to have the bed joint mortar cover the wall anchor structure. Thus, the wall reinforcements are usually structured form 0.148 or 0.187 inch wire, and, in practical terms, the wire formatives hereof that are inserted into the bed joints of the inner wythe have a height limited to approximately 0.187 inch. Further, for the purposes of this Application the term longitudinal axis as it relates to the side and intermediate wires of the reinforcement (as further described and defined below) is defined as shown on the relevant drawings.

[0046] In the detailed description, the wall reinforcements and the wall anchors are wire formatives and the veneer tie is a metal stamping. The wire used in the fabrication of masonry joint reinforcement conforms to the requirements of ASTM Standard Specification A9521-00, Table 1. For the purpose of this application weld shear strength test, tensile strength tests and yield tests of masonry joint reinforcements are, where applicable, those denominated in ASTM A-951-00 Standard Specification for Masonry Joint Reinforcement. In the descriptions of wall anchors which follow, the wall anchors are extension of the ladder-type or the truss-type reinforcements. As the attachment methodology follows that of fabricating the Masonry Joint Reinforcements, the tests for the wall anchors, except where fixturing is dictated by configuration, follow the A-951 procedures.

[0047] In the detailed description of the anchoring systems hereof the various wall anchor embodiments have elements which receive interlocking or interengaging portions of the veneer ties. The wall reinforcements and anchors are wire-formatives of varied shapes and configurations horizontally disposed in the cavity for receiving and interlocking with veneer ties. The veneer ties are metal stampings.

[0048] Another term defined for purposes of this application is wall reinforcement. A wall reinforcement is a continuous length of Lox All™ Truss Mesh or Lox All™ Ladder Mesh manufactured by H&B or equivalent modified to include an integral anchor and adapted for embedment into the horizontal mortar joints of a masonry backup wall. The wall reinforcements are prefabricated from cold-drawn steel wire and have parallel side rods with fused cross rods or truss components. The wall reinforcements for anchoring systems are generally structured from wire that is at least 0.148 and 0.187 in diameter. Further, the term masonry block is used to describe the materials of the backup wall and the exterior wall. Masonry block is defined to include brick, block, concrete masonry unit, stone, or any other similar material.

[0049] In the embodiments described herein below, the anchoring system for cavity walls is detailed. In masonry construction, shown in the embodiments hereof, utilizing this novel invention provides greater reinforcement and veneer displacement protection.

[0050] Referring now to FIG. **1** through **5**, the first embodiment of an anchoring system utilizing a backup wall reinforcement with T-type siderails is shown and is referred to generally by the numeral **10**. In this embodiment, a masonry wall structure **12** is shown having a backup wall or exterior

wythe **14** of masonry blocks **16** and a facing wall, exterior wall or veneer **18** of facing brick or stone **20**. Between the backup wall **14** and the facing wall **18**, a cavity **22** is formed, which cavity **22** extends outwardly from the interior surface **24** of backup wall **14**. The backup wall **14** and the facing wall **18** have interior surfaces or sides **24** and **17**, respectively that face the cavity **22**.

[0051] In this embodiment, successive bed joints **26** and **28** are formed between courses of blocks **16** and the joints are substantially planar and horizontally disposed. Also, successive bed joints **30** and **32** are formed between courses of facing brick **20** and the bed joints are substantially planar and horizontally disposed. For each structure, the bed joints **26**, **28**, **30** and **32** are specified as to the height or thickness of the mortar layer and such thickness specification is rigorously adhered to so as to provide the requisite uniformity for quality construction. Selected bed joint **26** and bed joint **30** are constructed to align, the one with the other so as to be substantially coplanar. For descriptive purposes, an x-axis **34** is drawn parallel to the intersection of the plane just described and the backup wall facial plane. Additionally, as seen in the drawing, an intersecting vertical line is drawn through the x-axis **34** to form the y-axis **36**. A horizontal line or z-axis **38**, normal to the xy-plane, also passes through the coordinate origin formed by the intersecting x- and y-axes.

[0052] In the discussion which follows, it will be seen that the various anchor structures are constructed to restrict movement interfacially—wythe vs. wythe—along the z-axis **38** and along the x-axis **34** and y-axis **36**. The wall structure **10** includes a reinforcement device or wall reinforcement portion **48** with an integral anchor or wall anchor portion **60**. The reinforcement device **48** is embedded in the bed joints **26** and **28** and includes two side rails or wires **50**, **52** which are parallel to each other. One or more intermediate wires **54**, **56** are attached to the interior sides or surfaces of **57**, **58** of the side rails **50**, **52** and maintain the parallelism of the side rails **50**, **52**. The intermediate wires form a ladder **54**, **56** configuration or optionally, a truss configuration (not shown). The longitudinal axis **15** of the intermediate wires **54**, **56** and the side rails **50**, **52** is shown on FIG. **2**. The side rails **50**, **52** and of the intermediate wires **54**, **56** are substantially coplanar, and, when installed all lie in a substantially horizontal plane.

[0053] The reinforcement device **48** is a hybrid device which contains an integral anchor or wall anchor portion **60** formed from the side wire **52**. The anchor **60** is designed to extend into the cavity **22** for connection with a veneer tie or veneer anchor **44**. The anchor **60** contains t-type wire formatives or leg portions **70**, **72** and a buckle or veneer tie receptor portion **74** designed to engage a veneer tie **44**. The anchor **60** is designed to form any shape that would adequately connect with the veneer tie **44**. The preferred shape is elliptical. The interior of the ellipse provides an opening or receptor **90** for interconnection with the veneer tie **44**. The interior of the veneer tie receptor portion **74** has a measurement along the minor axis "A" **90**. The exterior of the veneer tie receptor portion **74** has a measurement along the major axis "B" **98**.

[0054] To anchor the veneer or outer wythe **18**, a veneer tie or anchor **44** is constructed to interengage with the wall anchor **60**. The veneer tie **44** is a metal stamping which comprises an insertion portion or strap **45** with an insertion portion or free end portion **47**. The strap **45** has an upper portion **78**, a lower portion **80**, and an intersecting portion **82** formed at the intersection of the upper portion **78** and the lower portion **80**. The upper portion **78** has a width measurement "C" **51** measured from end to end. Measurement C **51** is slightly less than dimension A **90** but close enough in width to allow the insertion end to fit snugly within the anchor to limit lateral displacement and movement along the z-axis **38** and the x-axis **34**. The lower portion **80** is continuous with the upper portion **78** and has an intersecting portion **82**. The veneer tie **44** has a measurement "D" **84** that is measured from the intersecting portion **82** to maximum distance of the lower portion **80** when the lower portion **80** is swung in a circular motion. Measurement D **84** is less than measurement A **90** to allow the veneer tie **44** to be swung or twisted and dropped (as shown in FIG. **5**) into the wall anchor **60**. The lower portion **80** has an end-to-end measurement "E" **92** that is greater than measurement A **90** and preferably great than measurement B **98** to ensure that the veneer tie **44** remains locked within the anchor **60** and cannot, when held horizontal within bed joint **26** or **28**, escape upon vertical displacement. The securement of the anchor **60** to the veneer tie **44** is accomplished without tools, lessening the burden on the installer and the number of parts and devices required to complete the seismic construct.

[0055] The veneer tie **44** contains a free end portion **47**. The free end **47** includes a cavity portion **67** and an insertion portion or bed joint portion **77**. The cavity portion **67** spans the cavity **22** and the insertion portion is dimensioned for disposition within the bed joint **30** of the facing wall **18**. When inserted in the facing wall **18**, the free end **47** is in a substantially horizontal plane with the bed joint **30**. The bed joint portion **77** contains one or more reinforcement notches **69** to secure a reinforcement wire **71** within the bed joint portion **77** for embedment in the bed joint **30** of the facing wall **18**. The inclusion of the reinforcement wire **71** completes the seismic construct. The veneer tie **44** optionally contains an offset (not shown) similar to that shown in the second embodiment below. The free end **47** optionally contains apertures **73** to limit thermal transfer. Optionally, insulation (not shown) may be added to the interior **24** of the backup wall **14**. If insulation is installed, the strap **45** abuts the insulation, thereby providing further anchor **60** and veneer tie **44** support.

[0056] The description which follows is of a second embodiment of an anchoring system utilizing a backup wall reinforcement with T-type siderails. For ease of comprehension, where similar parts are used reference designators "100" units higher are employed. Thus, the facing wall **118** of the second embodiment is analogous to the facing wall **18** of the first embodiment. Referring now to FIGS. **6** through **10**, the second embodiment of a backup wall reinforcement with T-type siderails of this invention is shown and is referred to generally by the numeral **110**.

[0057] In this embodiment, a masonry wall structure **112** is shown having a backup wall **114** of masonry blocks **116** and a facing wall, exterior wall or veneer **118** of facing brick or stone **120**. Between the backup wall **114** and the facing wall **118**, a cavity **122** is formed, which cavity **122** extends outwardly from the interior or inner surface **124** of backup wall **114**. The backup wall **114** and the facing wall **118** have interior sides **124**, **117**, respectively that face the cavity **122**.

[0058] In this embodiment, successive bed joints **126** and **128** are formed between courses of blocks **116** and the joints are substantially planar and horizontally disposed. Also, successive bed joints **130** and **132** are formed between courses of facing brick **120** and the joints are substantially planar and horizontally disposed. For each structure, the bed joints **126**, **128**, **130** and **132** are specified as to the height or thickness of the mortar layer and such thickness specification is rigorously

adhered to so as to provide the uniformity inherent in quality construction. Selected bed joint **126** and bed joint **130** are constructed to align, that is to be substantially coplanar, the one with the other line or x-axis **134** and an intersecting vertical line or y-axis **136**. A horizontal line or z-axis **138**, normal to the xy-plane, also passes through the coordinate origin formed by the intersecting x- and y-axes **134**, **136**.

[0059] In the discussion which follows, it will be seen that the various anchor structures are constructed to restrict movement interfacially—wythe vs. wythe—along the z-axis **138** and along the x-axis **134** and y-axis **136**. The wall structure **110** includes a reinforcement device or wall reinforcement portion **148** with an integral anchor or wall anchor portion **160**. The reinforcement device **148** is embedded in the bed joints **126** and **128** and includes two side rails or wires **150**, **152** which are parallel to each other.

[0060] One or more intermediate wires **162**, **164** are attached to the interior sides or surfaces of **157**, **158** of the side rails **150**, **152** and maintain the parallelism of the side rails **150**, **152**. The intermediate wires form a truss **162**, **164** or a ladder configuration (not shown). The side rails **150**, **152** and the intermediate wires **162**, **164** all lie in a substantially horizontal plane. For the truss formation, an alternative formation with the intermediate wires providing a junction **166** with the anchor **160** that strengthens the reinforcement device **148** through a y-shaped weldment provides extra weld surface therealong. The longitudinal axis (not shown) of the intermediate wires **162**, **164** and the side rails **150**, **152** is substantially similar to the longitudinal axis **15** shown on FIG. **2**. The side rails **150**, **152** and of the intermediate wires **162**, **164** are substantially coplanar, and, when installed all lie in a substantially horizontal plane.

[0061] The reinforcement device **148** is a hybrid device which contains an integral anchor or wall anchor portion **160** formed from the side wire **152**. The anchor **160** is designed to extend into the cavity **122** for connection with a veneer tie or veneer anchor **144**. The anchor **160** contains t-type wire formatives or leg portions **170**, **172** and a buckle or veneer tie receptor portion **174** designed to engage a veneer tie **144**. The legs **170**, **172** form a throat **182**. The throat **182** has a width measurement E **184** measured from the exterior **186** of one leg **170** to the exterior **188** of the other leg **172** lying in a substantially similar plane.

[0062] The anchor **160** is designed to form any shape that would adequately connect with the veneer tie **144**. The preferred shape is elliptical. The interior of the ellipse provides an optional opening or receptor **199** for optional secondary securement with the veneer tie receptor **174**. The exterior of the veneer tie receptor portion **174** has a measurement along the major axis "B" **198**.

[0063] To anchor the veneer or outer wythe **118**, a veneer tie or anchor **144** is constructed to interengage with the wall anchor **160**. The veneer tie **144** is a metal stamping. The veneer tie **144** provides an interlocking portion or strap **177** continuous with an insertion or free end portion **179**. The interlocking portion **177** contains a slot **181** set completely within the interlocking portion **177**. The slot **181** may take a number of forms with the preferred form being slightly larger than measurement E **184** and B **198**. The slot **181** is dimensioned, to be compatible upon installation on the anchor **160** through an insertion and twisting motion or upon emplacement and rotation, so that is can be interlocked with the anchor **160** and secured in a horizontal manner. The slot **181** has a longitudinal length measured from the top **185** to the bottom **187** of the slot **181**. The longitudinal width of the slot **181** is greater than the measurement B **198**. The slot **181** has a latitudinal width measured from the greatest distance between the latitudinal sides **191**, **193**. The latitudinal width is greater than measurement E **184** and smaller than dimension B **198**. For connection to the anchor **160**, the slot **181** is placed over the anchor **160** and manually rotated 90 degrees to fit securely over the anchor **160** and locked into place. The securement of the anchor **160** to the veneer tie **144** is accomplished without tools, lessening the burden on the installer and the number of parts and devices required to complete the seismic construct. Once connected to the anchor, the veneer tie **144** restricts x-, y- and z-axes movement.

[0064] The veneer tie **144** free end portion **179** contains a cavity portion **147** that spans the cavity **122** and an insertion portion or bed joint portion **175** that is inserted into the bed joint **130** of the facing wall **118**. Upon securement of the veneer tie **144** to the anchor **160**, the free end **179** lies in a substantially horizontal plane with the bed joint **130** of the exterior wall **118**. The bed joint portion **175** contains one or more reinforcement notches **169** to secure a reinforcement wire **171** within the free end portion **179** for embedment in the bed joint **130** of the facing wall **118**. The inclusion of the reinforcement wire **171** completes the seismic construct.

[0065] The veneer tie **144** optionally contains an offset **197** in the cavity portion **147**. The offset **197** is configured to occur at the point where the cavity portion **147** meets the cavity wall **122**. The offset **197** locks the veneer tie **144** in place and further restricts movement. The free end **179** optionally contains holes or offsets **173** to limit thermal transfer. Optionally, insulation **123** may be added to the interior **124** of the backup wall **117**. If insulation **123** is installed, the interlocking portion **177** abuts the insulation **123**, thereby providing further anchor **160** and veneer tie **144** support. Another optional feature of the free end portion **179** is a securement notch **199** which is formed from the free end portion **179** and designed to interconnect with the anchor **160** providing even greater stability. The securement of the anchor **160** to the veneer tie **144** is accomplished without tools, lessening the burden on the installer and the number of parts and devices required to complete the seismic construct.

[0066] The description which follows is of a third embodiment of an anchoring system utilizing a backup wall reinforcement with T-type siderails. For ease of comprehension, where similar parts are used reference designators "**200**" units higher are employed. Thus, the wall reinforcement portion **48** of the first embodiment and the wall reinforcement portion **148** of the second embodiment are analogous to the wall reinforcement portion **248** of the third embodiment.

[0067] Referring now to FIGS. **11** through **13**, the third embodiment of a backup wall reinforcement with T-type siderails of this invention is shown and is referred to generally by the numeral **210**. In this embodiment, a cavity wall structure is not shown but is substantially similar to the cavity wall structure shown in FIGS. **1** and **6**. The anchoring system **210** includes a reinforcement device or wall reinforcement portion **248** with an integral anchor or wall anchor portion **260**. The reinforcement device **248** is embedded in the bed joints and includes two side rails or wires **250**, **252** which are parallel to each other. One or more intermediate wires **254**, **256** are attached to the interior sides or surfaces of **257**, **258** of the side rails **250**, **252** and maintain the parallelism of the side rails **250**, **252**. The intermediate wires form a ladder **254**, **256** configuration or optionally, a truss configuration (not shown).

The longitudinal axis of the intermediate wires **254**, **256** and the side rails **250**, **252** is substantially similar to that shown on FIG. **2**. The side rails **250**, **252** and of the intermediate wires **254**, **256** are substantially coplanar, and, when installed all lie in a substantially horizontal plane.

[0068] The reinforcement device **248** is a hybrid device which contains an integral anchor or wall anchor portion **260** formed from the side wire **252**. The anchor **260** is designed to extend into the wall cavity for connection with a veneer tie or veneer anchor **244**. The anchor **260** contains t-type wire formatives or leg portions **270**, **272**, **273** and a buckle or veneer tie receptor portion **274** divided into two sections **221**, **223** and designed to engage a veneer tie **244**. The leg portion **273** is formed from the intermediate wire **256**. The anchor **260** is designed to form any shape that would adequately connect with the veneer tie **244**. The preferred shape is elliptical. The interior of the veneer tie receptor portion **274** has measurements along the minor axes "A" **290** and "A**1**" **291**. The exterior of the veneer tie receptor portion **274** has a measurement along the major axis "B" **298**.

[0069] To anchor the veneer or outer wythe, a veneer tie or anchor **244** is constructed to interengage with the wall anchor **260**. The veneer tie **244** is a metal stamping which comprises insertion portions or straps **245**, **249** and an insertion portion or free end portion **247**. The straps **245**, **249** have upper portions **278**, **279** lower portions **280**, **281** and intersecting portions **282**, **283** formed at the intersection of the upper portions **278**, **279** and the lower portions **280**, **281**. The lower portions **280**, **281** are continuous with the upper portions **278**, **279** and have intersecting portions **282**, **283**. The upper portions **278**, **279** have a width measurement that is slightly less than the measurement A **290** and measurement A**1** **291** to allow for insertion and limit lateral displacement. The lower portions **280**, **281** are larger than the measurements A **290** and A**1** **291** and have a combined measurement that is preferably greater than measurement B **298** to ensure the veneer tie **144** is locked within the anchor **260**.

[0070] To allow for insertion of the veneer tie **244** into the anchor **260** measurements "C" **251** and "C**1**" **253** (measured from the intersecting portions **282**, **283** to the maximum distance of the lower portions **280**, **281** when the lower portions **280**, **281** are swung or twisted and dropped in a circular motion) are slightly less than measurement A **290** and measurement A**1** **291** but close enough in width to allow the insertion end to fit snugly within the anchor to limit lateral displacement and movement along the z-axis **238** and x-axis **234**. The securement of the anchor **260** to the veneer tie **244** is accomplished without tools, lessening the burden on the installer and the number of parts and devices required to complete the seismic construct.

[0071] The veneer tie **244** free end portion **247** includes a cavity portion **267** and an insertion portion or bed joint portion **277**. The cavity portion **267** spans the cavity and the bed joint portion **277** is dimensioned for disposition within the bed joint of the facing wall. When inserted in the facing wall, the free end **247** is in a substantially horizontal plane with the bed joint. The bed joint portion **277** contains one or more reinforcement notches **269** to secure a reinforcement wire (not shown) within the bed joint portion **277** for embedment in the bed joint of the facing wall. The inclusion of the reinforcement wire completes the seismic construct. The veneer tie **244** optionally contains an offset (not shown) similar to that shown in the second embodiment. The free end **247** optionally contains apertures **273** to limit thermal transfer. Optionally, insulation (not shown) may be added to the interior of the backup wall. If insulation is installed, the straps **245** abut the insulation, thereby providing further anchor **260** and veneer tie **244** support.

[0072] The anchoring system of this invention provides greater seismic and sheer protection than the prior art through the use of a hybrid reinforcement and anchor device with an interlocking veneer tie. The present device achieves this advancement through the use of a 3-axis restraint system between the anchor and the veneer tie.

[0073] The anchoring system utilizes only three components, the reinforcement/anchor, veneer tie and reinforcement wire to obtain the 3-axis restraint system and reinforcement and seismic protection. The limited number of manually installed components provides an easy to install economical solution providing a significant improvement over the prior art.

[0074] Because many varying and different embodiments may be made within the scope of the inventive concept herein taught, and because many modifications may be made in the embodiments herein detailed in accordance with the descriptive requirement of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense.

1. An anchoring system for use in a cavity wall having a backup wall and a facing wall in a spaced apart relationship having a cavity therebetween, said backup wall and said facing wall each having an interior side facing said cavity, said backup wall and said facing wall each formed from successive courses of masonry block each with a bed joint of predetermined height between each two adjacent courses and, further, each course of masonry block having an embedment surface lying in a substantially horizontal plane, said anchoring system comprising:

a wall reinforcement portion adapted for disposition upon one of said courses of masonry blocks for embedment in said bed joint of said backup wall, said wall reinforcement, further, comprising;

a pair of side wires;

one or more intermediate wires each having a longitudinal axis, said one or more intermediate wires attached to said side wires maintaining the parallelism thereof;

at least one wall anchor portion formed from one of said side wires configured to extend into said cavity, said wall anchor portion further comprising, in turn,

t-type wire formatives extending into said cavity, said t-type wire formatives forming a buckle dimensioned to engage a veneer tie.

2. An anchoring system described in claim **1**, wherein said anchoring system further comprises a veneer tie, said veneer tie comprising:

a strap, said strap dimensioned to extend through and interlock with said buckle; and

a free end portion continuous with said strap,

whereby upon twisting and dropping said strap through said buckle, said veneer tie is securely locked within said buckle.

3. An anchoring system as described in claim **2**, wherein said strap comprises:

an upper portion, said upper portion dimensioned to restrain lateral movement within said buckle;

a lower portion, said lower portion dimensioned to secure said strap within said buckle and limit vertical movement, said upper portion and said lower portion having an intersection; and

an intersecting portion, said intersecting portion formed at said intersection of said upper portion and said lower portion.

4. An anchoring system as described in claim **3**, wherein said free end portion further comprises:

a cavity portion, said cavity portion configured to span said cavity;

an insertion portion, said insertion portion continuous with said cavity portion and dimensioned for disposition within said bed joint of said facing wall; and

one or more reinforcement notches, said one or more reinforcement notches disposed on said insertion portion and dimensioned to receive a reinforcement wire;

5. An anchoring system as described in claim **4**, wherein said anchoring system further comprises:

a reinforcement wire, said reinforcement wire for insertion within said one or more reinforcement notches,

whereby, upon installation a seismic construct is formed.

6. An anchoring system as described in claim **4**, wherein said insertion portion is offset from said cavity portion, said insertion portion configured upon installation to secure said cavity portion against said interior of said facing wall.

7. An anchoring system as described in claim **2**, wherein said veneer tie is stamped metal.

8. An anchoring system for use in a cavity wall having a backup wall and a facing wall in a spaced apart relationship having a cavity therebetween, said backup wall and said facing wall each having an interior side facing said cavity, said backup wall and said facing wall each formed from successive courses of masonry block each with a bed joint of predetermined height between each two adjacent courses and, further, each course of masonry block having an embedment surface lying in a substantially horizontal plane, said anchoring system comprising:

a wall reinforcement portion adapted for disposition upon one of said courses of masonry blocks for embedment in said bed joint of said backup wall, said wall reinforcement, further, comprising;

a pair of side wires with the longitudinal axes thereof disposed parallel to one another, said pair of side wires having interior surfaces disposed opposite each other;

one or more intermediate wires each having a longitudinal axis, said one or more intermediate wires attached to said interior surfaces of said side wires maintaining the parallelism thereof and having the axes of said side wires and said intermediate wires being substantially coplanar;

at least one wall anchor portion formed from one of said side wires configured to extend into said cavity, said wall anchor portion further comprising, in turn,

t-type wire formatives extending into said cavity, said t-type wire formatives forming a buckle and a throat dimensioned to engage a veneer tie.

9. An anchoring system as described in claim **8**, wherein said anchoring system further comprises a veneer tie, said veneer tie, in turn comprising:

a strap, said strap dimensioned to interlock with said wall anchor portion, said strap having a slot, said slot dimensioned to be inserted over said buckle and said throat; and

a free end portion continuous with said strap,

whereby upon emplacement and rotation of said strap on said wall anchor portion, said veneer tie is securely interlocked with said wall anchor portion.

10. An anchoring system as described in claim **9**, wherein said slot is dimensioned upon installation to restrain lateral and vertical movement.

11. An anchoring system as described in claim **9**, wherein said free end portion further comprises

a cavity portion, said cavity portion configured to span said cavity;

an insertion portion, said insertion portion continuous with said cavity portion and dimensioned for disposition within said bed joint of said facing wall; and

one or more reinforcement notches, said one or more reinforcement notches disposed in said insertion portion and dimensioned to receive a reinforcement wire.

12. An anchoring system as described in claim **11**, wherein said anchoring system further comprises:

a reinforcement wire, said reinforcement wire for insertion within said one or more reinforcement notches,

whereby upon installation a seismic construct is formed.

13. An anchoring system as described in claim **11** wherein said cavity portion contains one or more securement notches, said one or more securement notches configured to interconnect with said buckle.

14. An anchoring system as described in claim **11**, wherein said insertion portion is offset from said cavity portion, said insertion portion configured upon installation to secure said cavity portion against said interior of said facing wall.

15. An anchoring system as described in claim **11**, wherein said backup wall further comprises a layer of insulation whereby upon installation of said veneer tie, said strap is dimensioned to be secured against said insulation.

16-20. (canceled)

21. An anchoring system as described in claim **8**, further comprising bends in said one side wire defining said t-type wire formatives.

22. An anchoring system as described in claim **1**, further comprising bends in said one side wire defining said t-type wire formatives.

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