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TIE ASSEMBLY FOR FACED MASONRY WALL STRUCTURES

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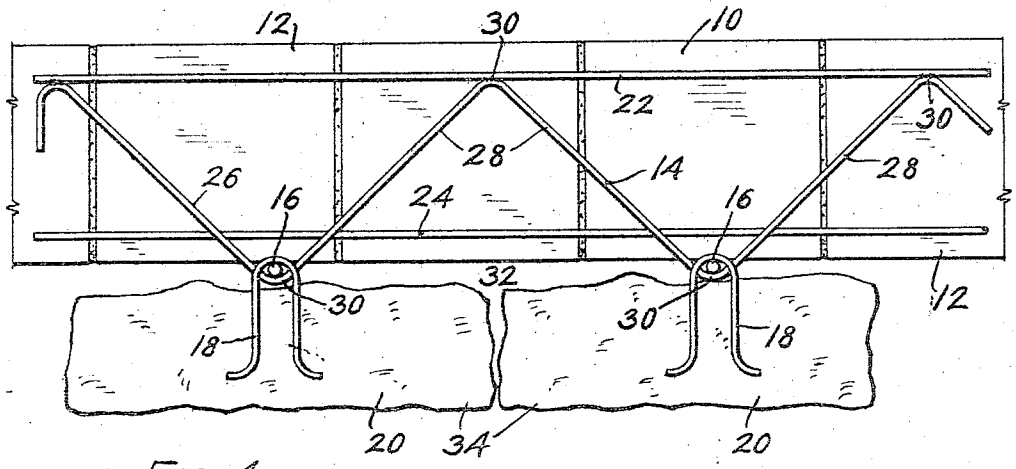


FIG. 1.

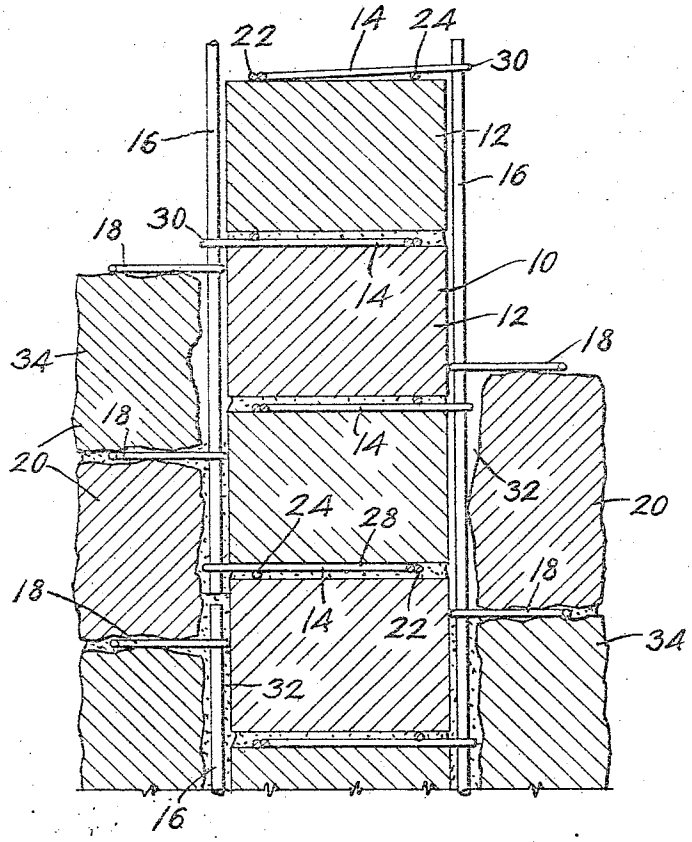


FIG. 2.

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TIE ASSEMBLY FOR FACED MASONRY WALL STRUCTURES

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This invention relates to building wall construction and, more particularly, to apparatus by which decorative and ornamental exterior facings can be tied into back-up walls.

All masonry building walls are constructed to include some type of interior supporting structure that is covered with the weather-wall or exterior facing. In many instances this back-up wall comprises a cinderblock wall to the surface of which is attached the facing comprising brick, natural stone, artificial stone, etc. Even though the facing is bonded to the back-up wall with mortar, most building codes also require some additional mechanical interlock or tie therebetween to insure a tight permanent bond.

In brick walls strap metal ties are cast into the joints of the back-up wall when it is erected and these project outwardly so that they can also be cemented into the joints of the facing by the masons. No particular problem exists in this connection because the courses of brick align with the joints in the back-up wall allowing the tie straps to extend horizontally therebetween. Stone-faced walls, on the other hand, present an altogether different problem.

To begin with, the stone facing is heavier due to the thicker blocks and a more secure interlock is necessary. The stone rarely has the parallel faces that will stack one upon the other thus introducing shear stresses that lessen its load-bearing capabilities. The uneven surfaces of the stone require that it be set out further from the adjacent flat face of the back-up wall than is the case with brick or other uniformly shaped products and this, in turn, necessitates a very thick mortar joint which is not particularly strong. All in all, an adequate tie between the facing and back-up wall becomes especially significant in stone-faced structures.

Normal practice is to reinforce the back-up wall itself by laying a strip of interlaced wire along the top of every second course of the cinderblock from end-to-end thereof, adding the mortar and the next higher courses. This ties the back-up wall blocks together longitudinally but is independent of the facing stones. The latter are tied in by using straps or wires extending across the gap between the back-up wall and facing that are cast by the mortar into the respective mortar joints in the same way as a brick facing. These straps or wires are, of course, cast first into the back-up wall which is laid up first and they thus become more or less permanently positioned.

Unfortunately, when the facing is being erected, the joints therein more often than not fail to match up with a corresponding joint in the back-up wall due to the tremendous variation in the thickness of the pieces of stone. When this occurs, the masons are quite apt to bend the tie down flush against the face of the back-up wall rather than attempt to shape them so as to correspond with a stone joint. This practice, while obviously improper, is undetectable in the finished wall as the stone face covers the tie straps or wires whether they have been used properly or not.

It has now been found in accordance with the teaching of the instant invention that the foregoing difficulties can be eliminated entirely while, at the same time, providing an excellent tie between the facing and back-up wall. Furthermore, this desirable end can be accomplished through the use of only one extra element in the assembly in addition to those already employed as a means for

tying the two wall structures together. This additional element is quite inexpensive and is commercially available already in the construction industry. The remaining elements of the assembly comprise relatively minor, but nonetheless significant, modifications in the webbing and ties. Perhaps the most significant feature, however, is the fact that improved assembly is much easier and faster to use than any of the prior art attempts to solve this vexing problem and it is so versatile that no tie need be left unused.

Specifically, the conventional back-up wall webbing that is used to tie the cinderblocks together longitudinally has been redesigned to provide a series of longitudinally-spaced bights that project outwardly from the face of the back-up wall into the gap left between it and the facing. The remainder of the webbing is covered with mortar and bonded into the joints between the courses of the back-up wall to perform the same longitudinal tie-in function it has always performed thus eliminating the need for anything else to accomplish this necessary end.

The bights or V-shaped portions of the webbing that project beyond the face of the back-up wall, in effect, form loops arranged in vertically-aligned relation into which are inserted ordinary concrete reinforcing rods that extend up the gap left between the two wall surfaces. Then as the various courses of the stone are laid up, generally U-shaped wire ties are passed behind the vertical rods and slipped up or down as necessary to rest atop the stone. The final step is to pack mortar into the gap between the walls and around the free ends of the ties thereby securely locking all elements of the wall assembly together into a contiguous unit.

It is, therefore, the principal object of the present invention to provide a novel and improved assembly for tying decorative building wall facings to the back-up wall.

A second object is the provision of a device of the class described which substantially eliminates the need for reshaping the ties to place them in alignment with the stone joints.

Another objective of the invention herein claimed is to provide a wall tying assembly that utilizes readily available materials with the exception of the webbing which requires only slight modification.

Still another object is the provision of means for attaching a stone facing to a back-up wall that should eliminate once and for all any inclination of the masons to dispense with the use of ties whenever needed and specified.

An additional object of the invention herein claimed is the provision of a wall-tie system that involves the use of no radically different techniques on the part of the masons, but rather, requires only elemental additions to those already used.

Further objectives are to provide apparatus for securely tying a facing to a back-up wall that is extremely simple, inexpensive, versatile, effective, fast and easy to use.

Further objects will be in part apparent and in part pointed out specifically hereinafter in connection with the description of the drawings that follows, and in which:

FIGURE 1 is a top plan view of a stone-faced building wall showing the webbing in place on a course of the back-up wall, the reinforcing rods inserted within the bights of the webbing, and the ties laid in place on the stone course; and,

FIGURE 2 is a vertical section showing the manner in which the tie system is employed on a double-faced stone wall.

Referring now to both figures of the drawing for a detailed description of the present invention, reference numeral **10** has been used to designate the so-called "back-up" wall which customarily consists of a number of cin-

derblocks **12** arranged in rows or courses one above the other in longitudinally staggered relation so that their vertical joints do not lie one above the other. The present custom in erecting stone-faced walls is to tie these cinderblocks of the back-up wall together longitudinally every second course. The most widely used device for this purpose is a wire web that comprises a pair of rods arranged in parallel relation and spaced apart somewhat less than the depth of the cinderblock on which they are to be laid. These rods are interconnected by a zig-zag shaped length of wire whose corner bends are welded to the parallel rods on the inside face thereof so as to not project therebeyond. This webbing is fabricated in convenient lengths to cover several blocks laid end-to-end yet short enough for convenient handling by the stone mason.

The webbing **14** that forms an important element of the wall-tie apparatus of the present invention is quite similar to that described above in several respects but it is also different in certain other ways and these differences are most important as they enable the webbing to be used in combination with the reinforcing rods **16** and ties **18** to tie the facing **20** to the back-up wall **10** in addition to the present function of tying only the cinderblocks together longitudinally. As shown best in FIGURE 1, the two parallel rods **22** and **24** are still used and they are spaced apart a distance somewhat less than the depth of the cinderblocks **12**. Even the zig-zag shaped length of wire **26** is employed to interconnect the parallel rods; however, here the similarity ends because the sections **28** of this wire that extend between the corner bends forming bights **30** are considerably longer so that the bends along one side thereof project well beyond the adjacent rod **24** and even about an inch or so beyond the surface of the back-up wall that is to be faced. In other words, the bends along one side of the zig-zag wire are attached as before to the inside of parallel rod **22** and thus do not project beyond this wire or beyond the adjacent surface of the backup wall; whereas, the other parallel rod **24** is attached to the zig-zag wire at points spaced a substantial distance in from the corner bends. It should, perhaps, be mentioned at this point that the manner just described for attaching rod **22** to the zig-zag wire at the corners or bights **30** is not critical but is preferred since only a single weld is required and, while the system would work just as well if rod **22** were likewise attached at points spaced inwardly from the bends, no useful purpose would be served by so doing. One might reason that by letting the bends on both sides of the zig-zag project beyond their adjacent parallel rods and also the face of the back-up wall, that a double faced construction like that shown in FIGURE 2 would be simplified. To some extent this is true, however, double-faced walls are relatively rare and these corners projecting beyond the face of a wall that was to be given an interior finish such as, for example, plaster or paint would be a definite handicap. Furthermore, a double-faced wall like that shown in FIGURE 2 would likely require webbing for each course anyway due to the added load so alternate courses could easily have the projecting corners extend onto opposite faces as shown thus providing the necessary tie for each decorative face.

When the mortar is placed on top of the webbing and the next course of cinderblock added, the webbing is permanently bonded in place and the blocks are securely interlocked in end-to-end relation. The only precaution that is necessary is to be sure that the projecting bends **30** are in substantial vertical alignment so that no difficulty will be experienced in passing the reinforcing rods **16** down through several of the triangularly-shaped openings produced by said bends or bights. The loops should project beyond the face of the back-up wall far enough to allow some leeway for misalignment. In stone-faced walls it is customary to have a one to two inch gap **32** between the adjacent surfaces of the back-up wall and facing which is ample to allow for a good portion of the bends to extend into the gap.

The next operation is to erect the stone facing **20** on the front of the back-up wall. As each stone **34** is laid into place and cemented to the one beneath, a generally U-shaped wire tie **18** is passed behind the rod **16**, adjusted up or down as needed, and the legs thereof laid on top of the stone. If a stone is particularly shallow so that the legs would project onto the exposed surface thereof, it is a simple matter to spread them apart. This same technique would be used to bridge a mortar joint should one occur immediately in front of the rod. As each course or so of stone is completed, mortar is packed down into the gap or space **32**. This serves two important functions, namely, to bond all elements of both walls and the tie assembly together into a single integral unit and to provide a base upon which the next higher rod can rest without slipping down to the base of the wall. Thus, it will be seen that no excuse remains for leaving out a tie or failing to lock each stone into the completed wall structure.

One other point should be mentioned briefly and that is the U-shaped wire ties **18** could be used between the courses of cinderblock to hold the reinforcing rods in place as well as to tie in the stones. This, however, is a much more difficult and time-consuming operation for the mason. Furthermore, most architects require that the webbing be used anyway and it is far more practical, and certainly more economical, to use the webbing as herein modified as both the reinforcement for the cinderblock back-up wall and the means for fastening the vertical rods in the gap between the two wall surfaces.

The present invention is, of course, not limited to stone-faced wall structures and could be used in ordinary brick-faced construction; however, the latter presents few problems while the former necessitates special techniques to which the above-described tie assembly is ideally suited.

Having thus described the several useful and novel features of the wall-facing tie-in apparatus, it will be apparent that the many worthwhile objects for which it was designed have been achieved. While only a single specific embodiment of the invention has been illustrated therein, I realize that certain changes and modifications therein may well occur to those skilled in the art within the broad teaching hereof; hence, it is my intention that the scope of protection afforded hereby shall be limited only insofar as said limitations are expressly set forth in the appended claims.

What is claimed is:

1. In combination: reinforcing means adapted to be cast into the mortar joint between courses of flat-faced generally rectangular blocks forming a back-up wall, said reinforcing means including bight-forming portions projecting from at least one face of the back-up wall at longitudinally-spaced intervals; rod means adapted to be passed through at least two of the bights projecting from the surface of the back-up wall, said bights being located one above the other and comprising portions of reinforcing means cast in different courses; and, tie means adapted to be cast into the mortar joints between courses of irregularly-shaped blocks erected as a facing adjacent the surface of the back-up wall having the rods secured thereto, said tie means including means securing same to the rod means for adjustable movement in the direction of the length of the latter and a portion projecting from said securing means into position for insertion into the joint between facing blocks laid one on top of the other, said tie and rod means cooperating with the reinforcing means to fasten the facing blocks to the back-up wall thus forming a unitary wall structure irrespective of whether the mortar joints between courses of the back-up wall are aligned with joints between the facing blocks.

2. The combination as set forth in claim **1** in which the reinforcing means is of a length adapted to bridge the mortar joints at opposite ends of the back-up wall blocks thus tying the latter together longitudinally.

3. The combination as set forth in claim 1 in which the bight-forming portions of the reinforcing means comprise corner bends interconnecting diagonally-extending sections of a zig-zag shaped length of wire.

4. The combination set forth in claim 1 in which the securing means of the tie means comprise a hooked portion adapted to receive the rod means by being hooked therebehind.

5. The combination as set forth in claim 1 in which the bight-forming portions of the reinforcing means project from only one face of the back-up wall.

6. The combination as set forth in claim 1 in which the tie means comprise generally U-shaped wire members and the securing means thereof is the laterally-extending section interconnecting the legs at one end which can be located behind the rod means with the legs projecting outwardly therefrom.

7. The combination as set forth in claim 3 in which the reinforcing means also includes a pair of elongate strands of wire fastened to said zig-zag shaped length thereof in fixed substantially parallel relation to one another spaced apart a distance less than the depth of the back-up wall blocks measured between exposed faces thereof, one of said strands of wire being fastened substantially tangent to the bights along one side of said zig-zag shaped portion while the remaining wire is fastened to points on the diagonally-extending sections thereof spaced inwardly from the bights so as to define therewith a plurality of triangularly-shaped openings adapted to pass the rod means.

8. Wire webbing adapted to be cast into the mortar joint between courses of building block with which it is to be used and positioned across the joints therebetween for the purpose of reinforcing same lengthwise while providing means projecting from an exposed face of said block wall that can be used to tie a masonry facing thereto which comprises, a pair of elongate strands of wire each having a length greater than the distance between the ends of the building block, and a zig-zag shaped length of wire interconnecting the elongate strands and maintaining same in substantially parallel relation spaced apart a distance less than the depth of the block measured between the exposed faces thereof, said zig-zag shaped length of wire including corner bends forming bights interconnecting generally diagonally-extending sections, one of said parallel strands of wire being secured to the corner bends along one side of said zig-zag wire while the remaining strand is fastened at points on the diagonal sections spaced inwardly from the corner bends to define therewith triangularly-shaped openings positioned to project beyond the adjacent face of the block wall.

9. In combination: wire webbing adapted to be cast into the mortar joint between courses of flat-faced generally rectangular blocks forming a back-up wall, said webbing comprising a pair of elongate relatively straight strands of wire of a length greater than a single block so as to bridge the mortar joints at opposite ends thereof and a zig-zag shaped length of wire interconnecting said strands in fixed substantially parallel relation spaced apart a distance less than the depth of a block measured from front to rear, said zig-zag shaped length of wire including corner-forming bends along both sides interconnecting

sections extending generally diagonally therebetween for a distance substantially greater than the depth of the block so that when the corner bends along one side are positioned entirely inside the adjacent exposed face of a block those along the other side will project beyond the opposite exposed face, one of said parallel strands being fastened to the zig-zag shaped length of wire at points on the diagonal spaced inwardly of the projecting corner bends to define triangularly-shaped openings therewith while the remaining strand is fastened to the corner bend along the opposite side; elongate straight rods of a length greater than the height of the blocks adapted to be passed through at least two vertically-aligned triangularly-shaped openings projecting from the same face of the back-up wall as a result of webbing laid in the joints between more than one course of blocks; and, a plurality of generally U-shaped wire ties adapted to be cast into the mortar joints between courses of a facing formed from irregularly-shaped blocks erected on the face of the back-up wall up which the rods extend, said ties including a pair of legs joined together at one end by a transverse section adapted to be located behind the rods with the legs projecting outwardly therefrom toward the facing, said ties being vertically adjustable up and down the rods for the purpose of locating the tie legs at the joints between courses of the facing blocks irrespective of whether said joints align with those of the back-up wall, and said ties forming the means by which the facing blocks are fastened to the back-up wall to form a unitary wall structure.

10. The combination as set forth in claim 9 in which the ties are formed of bendable wire so that the legs thereof may be spread apart to bridge the joint between adjacent facing blocks or foreshorten the legs thereof to accommodate shallow facing blocks.

11. The combination as set forth in claim 9 in which the wire strand fastened adjacent the corner bends in the zig-zag shaped length of wire is located tangent thereto thus providing a single point of attachment at each corner.

12. The combination as set forth in claim 9 in which the free ends of the tie legs are bent laterally to prevent same from pulling out of the mortar joint between courses upon the application of forces tending to separate the facing from the back-up wall.

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