

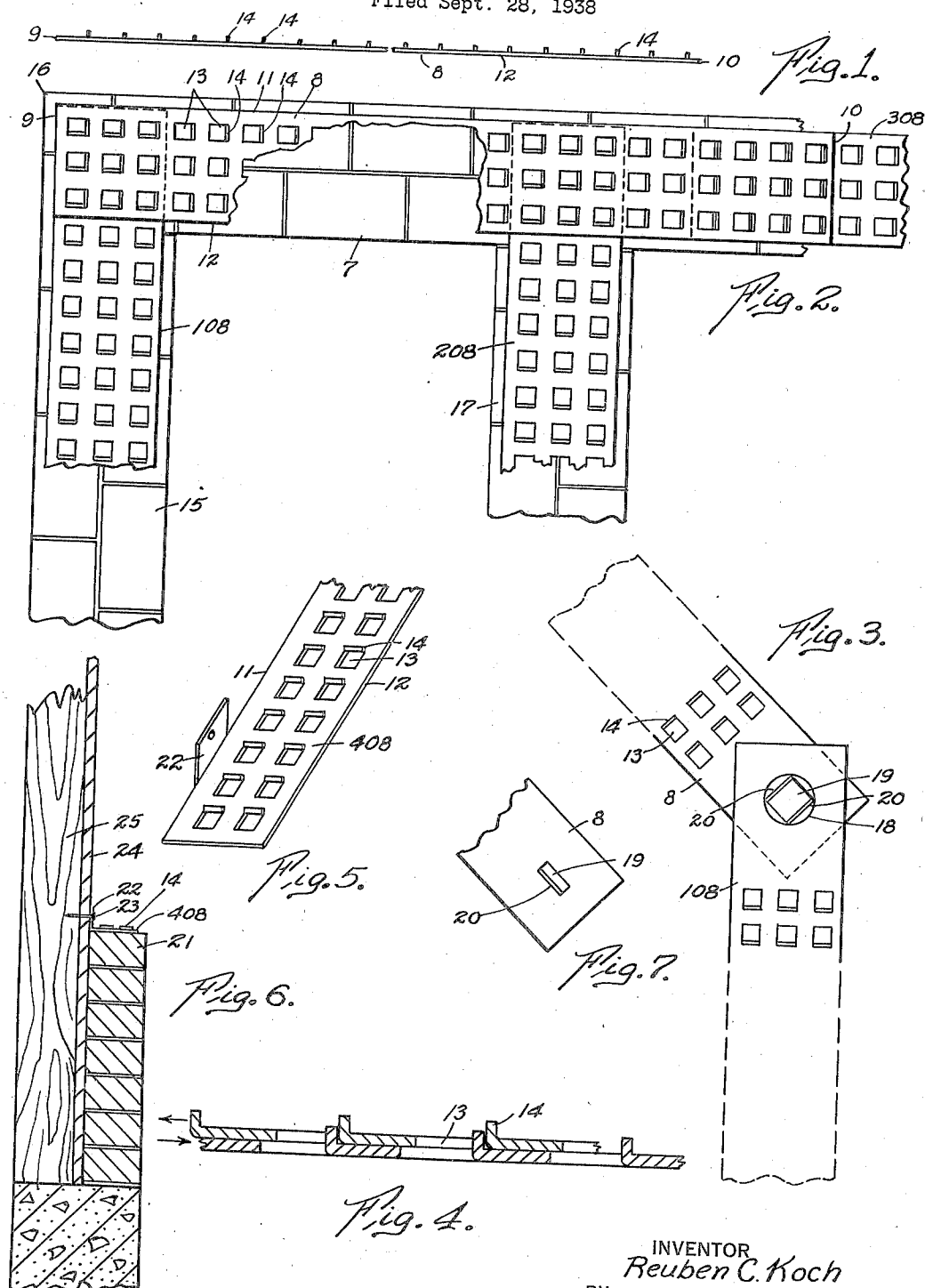
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REINFORCING MEANS

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REINFORCING MEANS

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9 Claims. (Cl. 72-103)

This invention relates to a reinforcing means to be embedded in walls between the courses of bricks, blocks, or other building units constituting such walls.

5 An object of the invention is to provide means in the form of interlocking plates especially adapted for precluding cracking, lateral bulging, or separation of a wall or its constituents.

10 Another object of the invention is to provide means for the purpose stated, which are simple, effective, and inexpensive, and which may be handled and used in practice with the exercise of a minimum of effort and inconvenience.

15 A further object of the invention is to provide novel and effective means for tying one wall to another, whether the walls be disposed at right angles, or at any other angle to one another.

20 Another object is to provide a form of reinforcing means having the advantages stated which may be employed to advantage in the application of brick veneer or the like to a wall requiring re-facing.

25 These and other objects are attained by the means described herein and disclosed in the accompanying drawing, in which:

Fig. 1 is an edge view or a side elevation, of a tie element of the invention.

30 Fig. 2 is a fragmental top plan view looking down upon a wall undergoing construction, with the tie element placed thereon in various relative positions.

Fig. 3 is a plan view of a modified form of tie element, having ends adapted for pivotal connection.

35 Fig. 4 is an enlarged longitudinal cross-sectional view showing two tie elements in overlapped and interlocked relationship.

Fig. 5 is a perspective view showing part of a modified tie element including a nailing flange.

40 Fig. 6 is a vertical cross-sectional view showing application of the Fig. 5 tie element to a building operation.

Fig. 7 shows an alternative form of interlock.

45 It has been a matter of common observation that walls built up of individual units and joined by the use of mortar or other binder, will sooner or later develop cracks of dangerous as well as unsightly proportions, or will bulge laterally, thereby weakening the structure to the extent
50 that expensive repairs or rebuilding may be necessary in order to render the wall safe and suited for the performance of its intended functions.

55 In such walls, as well as in monolithic walls, various forms of means have been proposed with

the object of curing or preventing the occurrence of the defects and deteriorations above mentioned: however, it is well known that none of such means or devices have performed with such satisfaction as would warrant their adoption by 5 the building industries. It is generally believed that the devices heretofore proposed for the above stated purposes, have failed either because of their expense, the inconvenience of handling and placing them, or because of their inability 10 to perform the service for which they were originally intended. The means of the present invention have been so designed and adapted as to eliminate the faults and objections which were common in the devices resulting from earlier 15 efforts.

With reference to the accompanying drawing, the character 7 indicates a wall constructed of building units, for example bricks, said wall having superposed upon a course of such building 20 units a series of tie elements of the present invention. In the illustration of Fig. 2, there are four tie elements shown, these being identified by the characters 8, 108, 208, and 308. These tie 25 elements are identical, wherefore it is necessary to describe in detail only the element 8. The tie element 8 is constructed of a length of sheet metal having ends 9 and 10, and longitudinal side edges 11 and 12. The side edges preferably 30 are parallel and straight, and in the preferred form of the device, the ends are at right angles to the side edges. At intervals along the length and width of the tie element a series of equally spaced apertures 13 are punched or otherwise 35 formed in the material of the tie element, thereby providing apertures each having four bounding walls of rectangular formation. At one end of each aperture, a lug 14 is constructed from the material of the sheet, so as to extend laterally 40 of the face of the sheet, a distance approximating the thickness of the material constituting the sheet. By preference, however, the lugs may extend a slightly greater distance from the surface 45 of the sheet or plate, so that the lugs of the one sheet will interlock with the apertures of the other sheet, when the sheets are overlapped either longitudinally or transversely as disclosed in Fig. 2. The construction and formation just described is rendered clearer by reference to Figs. 50 4 and 5.

It should be noted that the tie elements 8 which have been referred to also as sheets or plates, may be overlapped and interlocked as indicated at the extreme right of Fig. 2, so as to provide, in effect a continuous reinforcing means 55

along the entire length of a course of bricks or building units constituting the wall 7. The tie elements so overlapped and interlocked cannot possibly shift from a straight line relationship, nor can they be stretched or elongated as a composite tie in the direction of their length. When it is considered that mortar or other binder material is to be applied over the tie element arrangement disclosed in Fig. 2, and other courses of bricks built up thereon in the conventional manner, it will be appreciated that the completed wall cannot possibly bulge laterally, nor may it crack vertically and separate, because of the fact that the interlocked and embedded tie elements will effectively resist such movements of the wall and its constituents.

The character 15 indicates a wall disposed at right angles to the wall 7 as is customary when a corner 16 is to be formed. For reinforcing the corner and tying the walls together, the tie plates 8 and 108 are disposed at right angles to one another while resting upon a course of bricks or other units, in which relationship the lugs and apertures interlock just as effectively as when the tie elements are overlapped and arranged longitudinally as disclosed at the right of Fig. 2. It will be understood, of course, that the dimensions of the apertures 13 must be such as to provide for accommodating the lugs whether the tie elements be overlapped lengthwise or crosswise; that is, the length of each aperture must be slightly greater than the length of a lug, and the width thereof likewise must be slightly greater than the lug length.

At 17 is indicated a transverse wall abutting the face of wall 7, and tied thereto by overlapping the tie element 208 with tie element 8, with the lugs and apertures thereof interlocked. The lugs and apertures are all equally spaced throughout the length and width of each tie element so that the overlapping and interlocking may be effected at any location on the cooperating tie elements. It readily should be evident that shifting of the tie element 208 from its right angular relationship to the tie element 8, is impossible. A definite fixed relationship of wall 17 to wall 7 is thereby ensured.

Referring now to Fig. 3, there is disclosed a means of joining or interlocking a pair of tie elements 8 and 108, at an angular relationship other than a right angle. In this form of the device, the lugs and apertures are formed in the tie elements as previously explained, except that the extreme ends of the elements are left blank for the purpose of furnishing means for pivotally connecting the tie elements. Said means may comprise a circular opening 18 in the tie element 108, a rectangular opening 19 in the tie element 8, said opening 19 having opposite walls thereof turned outwardly of the plane of the tie element for development into opposed lugs 20. The lugs 20 are of a proper length and spacing such that the opening 18 will receive them with a fairly nice fit. The construction described results in a pivotal connection which enables wall sections to be tied together whether said sections be disposed at right angles, or at angles greater or less than a right angle. The portions of the plates 8 and 108 indicated by the broken lines are furnished with the lugs and apertures such as 13 and 14, as will be understood.

Accordingly tie elements of the character shown in Figs. 1 and 2, may be interlocked with

the tie elements of Fig. 3, either transversely or longitudinally.

Fig. 4 discloses plainly and on an enlarged scale the manner in which the tie plates such as 8 and 308 will interlock, when overlapped in the region of their adjacent ends. It will be noted that the apertures of these tie elements coincide, so that mortar or other binder material may find its way through to the course of bricks or units upon which the tie elements rest.

In the modified form of tie element disclosed in Figs. 5 and 6, the arrangement of lugs and apertures corresponds with the arrangement previously described but the width of the tie element may be reduced as shown, so that its side edges will not overhang the width of the bricks 21 (Fig. 6). The tie element 408 of Fig. 5 referably is furnished with nailing flanges 22 at intervals along the side edge thereof, so that the tie element may be nailed, as at 23, to the siding 24 of a building or other structure. The character 25 indicates a stud or other upright supporting the siding 24. By bonding the tie element 408 into the brick wall with mortar or the like, while the flange 22 is secured to the supporting wall 24, the brick veneer or facing shown in Fig. 6 will be effectively joined with the understructure or the existing wall to be brick veneer or faced. It should be understood that it is not necessary to interpose the tie elements between each course of bricks or building units, in order to preclude the bulging or cracking of the wall. In practice, it will ordinarily be found sufficient to employ the reinforcing means of this invention at intervals of several feet throughout the height of the wall under construction.

In Fig. 7 is shown an alternative form of interlock for the tie element 8 of Fig. 3, whereby a single lug 20, struck from the material of the tie element, may perform as a pivot means in cooperation with the circular aperture 18 of Fig. 3. In this form of lug structure, the length of the lug, of course, will preferably approximate the diameter of said circular aperture so as to fit snugly therein. The lug, if desired, may extend in a transverse direction across the tie element.

The tie elements may be manufactured in any convenient or desirable lengths, and preferably, though not necessarily, the gauge or thickness of the metal sheets from which they are formed may be such that a hand shear could be used for cutting them off where the ends might in some cases extend beyond the limits of the wall. The width of the tie element may be varied to suit the circumstances and conditions of usage, for as shown in Fig. 2, the width is somewhat less than the combined width of two building units, whereas in Figs. 5 and 6, the width is slightly less than the width of a single unit. The size of building unit to be used, therefore, may be a factor determining the width of the tie element. The spacing between the apertures 13 should be uniform lengthwise and crosswise of the tie elements, to enable interlocking of the tie elements both linearly and transversely, as previously explained, although the apertures and their corresponding lugs may be formed in any convenient and desirable sizes, so long as they will be capable of cooperating in the manner disclosed herein, and permit bonding of the building units with mortar or the like through the apertures. The number of rows of apertures in the tie elements is discretionary, as is also

the provision of strengthening ribs or corrugations. Various other modifications and changes in the structural details of the device may be made, within the scope of the appended claims, without departing from the spirit of the invention.

The use of the present invention obviates the need for header bricks or units as commonly employed for tying the inner and outer courses together. By so eliminating the header bricks, there is eliminated also the difficulties of leakage through the wall, and structural inaccuracies.

What is claimed is:

1. A tie element of the class described, comprising an elongated substantially flat plate having opposite ends, and means in the form of correspondingly spaced apertures and extending lugs struck from the material of the plate intermediate the ends of the plate for locking the plate against lateral shifting movement when said plate is placed flatwise upon another similar plate in transverse relationship thereto, with the lugs of one plate in interlocking engagement with the apertures of the other plate.

2. Structural reinforcing means which comprise a pair of tie elements each having a perforated body and a free end, the end of one of said elements being perforated with a circular opening, and the end of the other element being perforated to provide opposed straight-sided inner edges, and lugs struck from the material of said edges and extending from the face of said other tie element to enter the circular perforation of the first mentioned tie element.

3. Structural reinforcing means of the character described, which comprises a pair of tie elements each having a free end and a main body portion, said body portions each being of plate formation with a plurality of parallel rows of perforations extending lengthwise thereof, the perforations being equally spaced from one another both longitudinally and transversely of the body portion, lugs struck from the body portion at corresponding ends of the perforations and so proportioned as to interlock with the perforations of other substantially similar body portions, the free end of one of the tie elements of the pair having a circular perforation formed therein, and a lug extending from the face of the free end of the other tie element, for reception in the circular perforation aforesaid and providing therewith a pivotal interlock.

4. A structural reinforcing means of the character described, which comprises an elongated perforate plate, the perforations of the plate being arranged in a plurality of rows extending lengthwise thereof, and in substantial parallelism, with the spacing between adjacent perforations uniform in directions lengthwise and crosswise of the plate, and lugs struck from the material of the plate, at corresponding ends of the perforations, said lugs being of a length such as to be nicely received in similar perforations of a similar plate upon overlapping of the plates either longitudinally or transversely of one another.

5. A tie element for reenforcing a building wall, comprising an elongated substantially flat

plate of a width approximating the thickness of a building wall to be reenforced, a nailing flange extended from one of the longitudinal edges of the plate whereby the tie element may be fixed to a building structure adjacent to the wall, and means at a series of locations along the length of said plate for effecting an interlock with a substantially similar tie element in a series of selective linear and 90 degree transverse superposed relationships of such tie elements, at various degrees of overlap thereof.

6. A tie element of the class described and adapted for reenforcing a building wall, said tie element comprising an elongated substantially flat plate of a width approximating the thickness of a building wall to be reenforced, means including a plurality of rows of correspondingly spaced apertures and extending lugs intermediate the ends of the plate for locking the plate against lateral shifting and pivotal movement when said plate is placed flatwise upon and overlaps the lug-bearing apertured portion of another similar plate, and a nailing flange extended from one of the longitudinal edges of the plate, for fixation of the plate relative to an extraneous building structure.

7. Structural reinforcing means of the character described, which comprises a pair of tie elements each having a free end and a main body portion, said body portions each being of plate formation with a plurality of parallel rows of perforations extending lengthwise thereof, the perforations being equally spaced from one another both longitudinally and transversely of the body portion, laterally extending lugs struck from each body portion closely adjacent to the perforations and so proportioned that the lugs of one body portion will interlock with the perforations of the other substantially similar body portion when the body portions are overlapped.

8. A tie plate assembly for building walls, comprising a plurality of substantially flat and similar interchangeable elongated plates adapted for overlapping selectively linearly, or transversely at right angles, and a series of integral lugs and apertures in each plate, the lugs of one plate engaging the apertures of another plate when the plates are so overlapped, for locking together and precluding relative shifting movement of the plates in their respective planes.

9. A tie plate for building walls, comprising a substantially flat elongated plate for disposition lengthwise upon and between courses of building blocks, said plate having a plurality of rows of perforations formed thereon with the rows extending lengthwise of the plate, the distance between rows and the distance between the perforations of a row being equal, and a series of upstanding lugs each being located at a perforation and spaced in correspondency with the perforations, so that the lugs of one such plate will interlock with the perforations of a similar plate superposed thereon, in lengthwise and right angular crosswise relationship of the plates, to preclude relative shifting of the plates in their respective planes.

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