The present invention relates to a curtain wall building structure, and the following disclosure thereof is offered for public dissemination upon the grant of a patent therefor.

Curtain walls are now commonly applied to multi-story skeleton frameworks of steel or masonry walls, and may be erected with the building or added as a decorative or distinctive facing after the structure has been in use.

An important feature of the present invention is the elimination of the necessity for individually plumbing the panels of the curtain wall as they are erected. Instead, using a vertical backup wall, the present invention automatically produces a vertical curtain wall. Many decorative panels used for curtain walls have angular faces that make them difficult to plum. This poses no problem with the use of the present invention.

An additional significant feature of the invention is the provision of wall ties that are sturdy, not likely in tension, but also with respect to compression, bending, etc. At the same time the ties are capable of being inexpensively produced by common mass-production forming operations.

Further important objects of my invention are: to provide new and improved means for attaching panels of a curtain wall in proper spaced relation to a supporting backup wall and to each other; to utilize single wall ties for similar engagement with two adjacent panels to maintain them in alignment; to limit the spacing of the curtain wall from the adjacent surface of the backup wall; to draw ties against the outside surface of the backup wall; to utilize a block opening to position a tie in a projecting position from the face of a backup wall as erected; to attach a tie in projecting position from an erected backup wall; and, in general, to produce a more effective and efficient curtain wall for attachment to old structures and for application to new structures as they are constructed.

Further objects and advantages will be apparent from the following description taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of a portion of an apered block backup wall to which a curtain wall is applied by ties of the present invention; and

FIG. 2 is an enlarged sectional view on a line 2—2 of FIG. 1 of a tie engaging both the block backup wall and the exterior panel.

Although the following disclosure offered for public dissemination is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose, as it is these that meet the requirements of pointing out the parts, improvements or combinations in which the inventive concepts are found.

Referring now more particularly to FIGS. 1 and 2 of the drawings, a masonry backup wall is erected in an ordinary well known manner with perforated bricks or blocks 10. Such blocks are usually referred to as concrete or cinder blocks. They have holes 11 from top to bottom in the blocks. They are formed into a wall in situ and are held together by mortar 12 forming a joint therebetween. As the backup wall is built, metal ties 13 are inserted horizontally between the blocks 10. Each tie has an intermediate flat portion 14 less in thickness than the depth of the mortar joint into which it is embedded.

At the inner end of each tie 13 are upper and lower projections 15 and 16 to extend respectively into the holes 11 of upper and lower blocks in adjacent courses. At the outer end of each tie 13 are upper and lower front projections 17 and 18 to engage in corresponding recesses 19 and 20 in the lower and upper edges of the panels 21 and 22 respectively.

Between the ends of each tie 13 it is formed with a spacing portion 23 integral with the front projections 17 and 18, which fills the joint or space between the panels 21 and 22, and abutting their edges, acts as a spacer to hold them apart. The recesses 19 and 20 in the edges of the panels are about midway between their front and rear sides, and are slightly larger than the tie projections 17 and 18 which are inserted therein. These projections have rounded extremities 24 spaced from the bottoms of the recesses 19 and 20.

The outer surfaces 26 of the panels may have a coating of decorative or protecting material such as minerals, shells, gravel, and the like. Some portion 27 of this coating may be colored or otherwise distinctively displayed to constitute some figure or design with other such portions.

To limit the approach of the panels to the backup wall, and thus to space them apart, each tie 13 is formed with a projection 28 at right angles to it adapted to abut the outside of the backup wall blocks 10. This leaves a wall space 29 between the front of the backup wall 10 and the back of the curtain wall formed by the panels.

At least one of the outer sides of the intermediate portion 14 of a tie 13 is formed with corrugations or waves 30 adapted to adhere more firmly to mortar 12 between the blocks 10 to hold the tie in place.

The inner end of each tie 13 has the upper and lower projections 15 and 16 which project freely into their respective holes 11 in the blocks 10 in the tiers above and below the mortar joint in which the tie is mounted. This is determined by the abutment of the projection 28 with the outer face of the block. Some of the mortar will collect on top of the waves 30 abutting the upper projection 15 and between it and the upper adjacent wall 10 of the hole 11. Once the mortar sets the mortar between projection 15 and the wall of hole 11 will prevent the tie from moving outwardly. Thus the tie is then locked in place by projections 15 and 28.

However, provision also is made to similarly hold the tie in place even before the mortar has set. To achieve this, the lower projection 16 has a cylindrical outer end 31. A metal clip has a semi cylindrical portion 32 adapted to fit about and engage end 31. The clip also has an outer extremity 33 which bears against the outer side of projection 16 and an inner extremity 34 to abut the inner side of the projection 16 and the wall 10 of the hole 11 of the lower block 10.

As the backup wall is erected the outer faces 10a of the blocks 10 are plumbed. In the joints between appropriate courses, the ties 13 are embedded in the mortar joint. The tie 13 is placed with its projection 28 against the plumb the outer surface 10a of a block 10 its intermediate portion in the mortar joint on top of the block. Rear projection 16 is in the hole 11 of the block. Normally, clips 32—34 will already be in place on end 31 of projection 16. In any event after tie 13 is positioned and clip 32—34 is in place the extremity 34 thereof is sprung upwardly with the free end engaging the side 10b of the
block 10. Thus the tie 13 is secured to the block by projection 28 extremity 34. The curtain wall is erected concurrently with the back-up wall. Thus, upon reaching the level at which ties 13 are to be inserted, the lower panels 22 are placed in position. Concurrently with the insertion of the ties in the backup wall (as described in the preceding paragraphs) from lower projections 18 are inserted in upper recesses 20 in the panel. Since the clip 32-34 and projection 28 lock the tie 13 in place on the backup wall the alignment of the tie and thus of the curtain wall is fixed. Normally, some mortar 12z will be at least sloshed about the clip at projections 17 and 18 to fill any voids between the projections and the respective openings 19 and 20. The size of the horizontal joints will be determined by spacer portions 23 of the ties. These joints need not be completely filled with mortar as the curtain wall is erected. They can be grouted at a subsequent time. Even if a substantial amount of mortar is put in the horizontal joint the usual practice will be to leave an exterior space 25 for finish grouting. However, this will depend on practices of the mason contractor.

Ties 13 can be formed from extrusions, as for example aluminum extrusions. Such extrusions would be in the form of long lengths having a cross-section corresponding to that illustrated in FIGURE 2. These lengths are then cut transversely at one inch intervals, for example, to form individual ties. Clips 32-34 can be formed in a conventional manner, such as by a stamping operation.

I claim:

1. A wall tie for use in erecting a curtain wall of panels having edge openings therein in front of a backup wall of blocks having a central opening therein, said tie including: a pair of coplanar forward projections adapted to be positioned vertically and received in said edge openings; a rigid intermediate member extending rearwardly of said projections and including means immediately to the rear of said projections to contact said edges to space the adjacent panels a given distance apart; a downwardly extending intermediate projection a spaced distance rearwardly of the forward projections, parallel thereto and adapted to abut the front face of a block at a mortar joint, said intermediate projection extending rearwardly from said intermediate projection to project through said mortar joint and having a wavy face thereon; and adjustable means secured to said intermediate portion rearwardly of the front inner face of the block at the central opening and extending downwardly and forwardly to contact said front inner face to lock the tie on the block.

2. A wall tie for use in erecting a curtain wall of panels having edge openings therein in front of a backup wall of blocks having a central opening therein, said tie including: a pair of coplanar forward projections adapted to be positioned vertically and received in said edge openings; a rigid intermediate member extending rearwardly of said projections; a downwardly extending intermediate projection a spaced distance rearwardly of the forward projections, parallel thereto and adapted to abut the front face of a block at a mortar joint, said intermediate portion extending rearwardly from said intermediate projection to project through said mortar joint and having a wavy face thereon; and a metal clip having a portion engaging said lower end and a resilient arm extending forwardly therefrom to engage said inner front face.

3. A tie as set forth in claim 2, wherein said rear projection is parallel to the other projections, and wherein said tie includes an upwardly extending projection coplanar with said rear projection.

4. A tie as set forth in claim 3 formed of a transversely cut section of extruded aluminum.

5. A wall tie for use in erecting a curtain wall of panels, having means for engaging them at the edges, in front of a backup wall of blocks having vertical holes from top to bottom, said tie including: panel engaging means at the front end thereof for engaging said panels on the panel pairs; opposite upper and lower projections on the inner end to be received in the holes of the upper and lower blocks; rigid intermediate connecting means joining the projections at the front and rear and adapted to be in a mortar joint between backup blocks in adjacent courses and including a downward projection between the front and rear projections; and means engaging the lower rear projection for engaging said lower block at the side of the hole therein to draw the projection on the intermediate connecting means into contact with the front of the block.

6. The combination as set forth in claim 5, wherein the means engaging the lower rear projection includes a spring clip mounted on the lower rear projection, and having an arm projecting forwardly and movable to resiliently engage the inner surface of the block to hold said intermediate projection against the front of the block.

7. The combination as set forth in claim 6, wherein the end of the lower rear projection has a cylindrical bulb on the lower end thereof, and the clip has a mounting portion engaging the bulb, and said arm is resilient and of a length to engage the inner side of the block at different angles.

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