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J. L. MURPHY  
SOLID GROUTING BAR AND HANGER ELEMENT  
FOR SETTING SLABS AND METHOD

3,017,725

Filed March 27, 1957

5 Sheets-Sheet 1

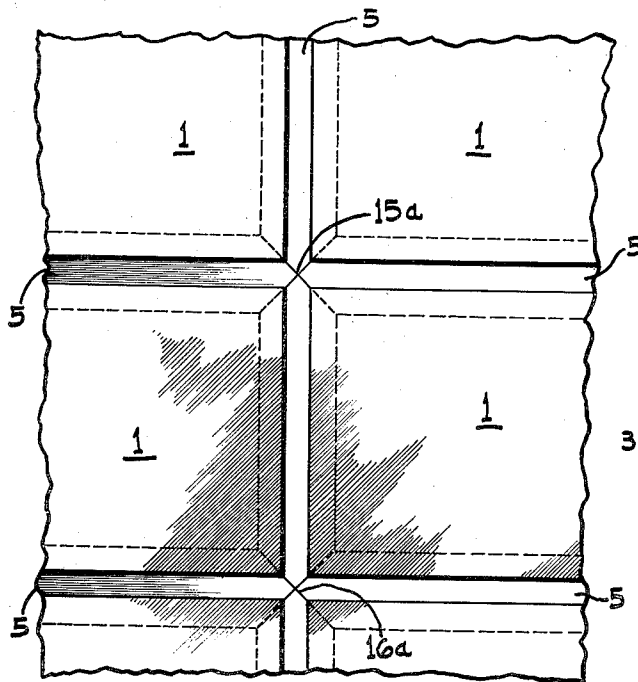


FIG. 1

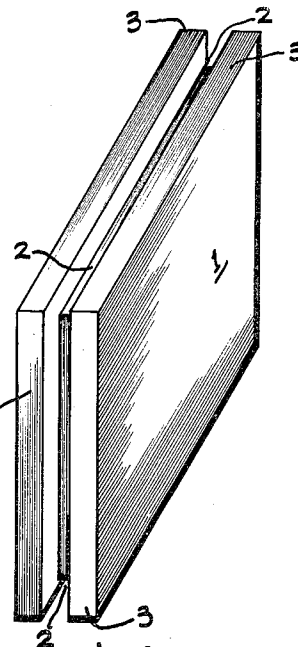


FIG. 2

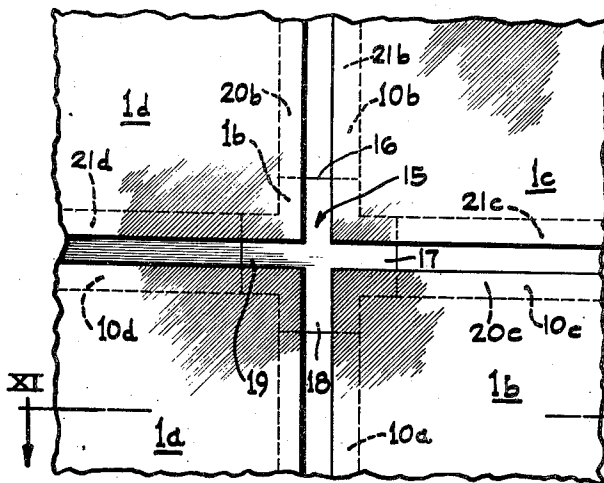


FIG. 3

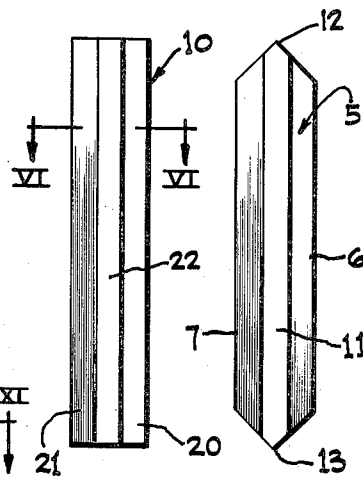


FIG. 4 FIG. 5

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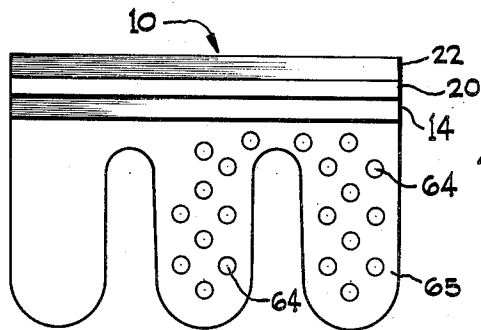


FIG. 9

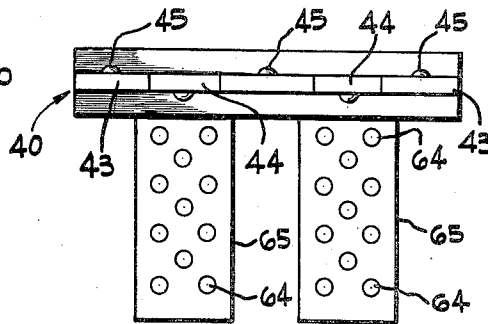


FIG. 10

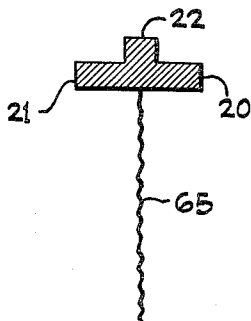


FIG. 6

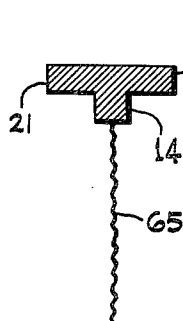


FIG. 7

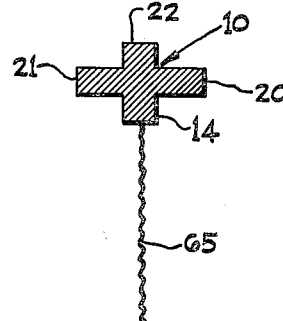


FIG. 8

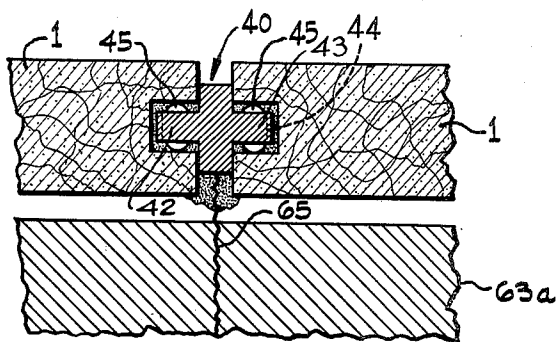


FIG. 11

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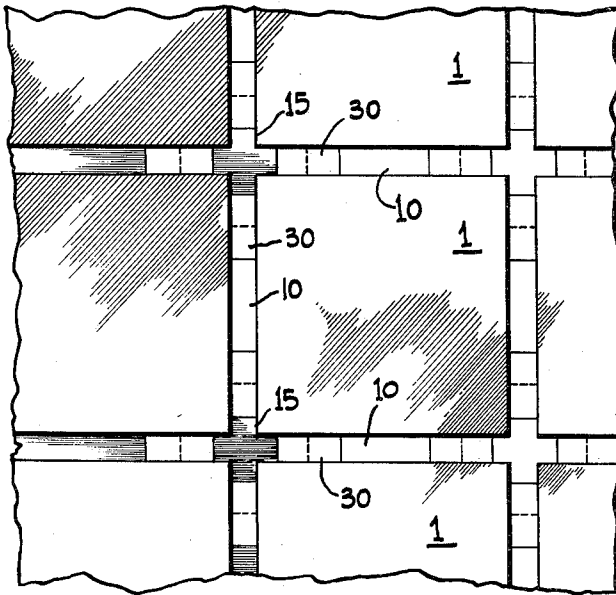


FIG. 13

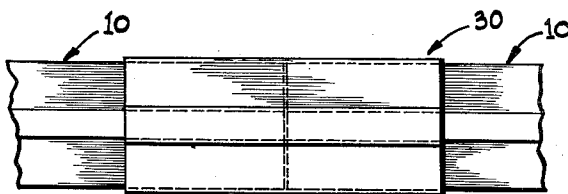


FIG. 14

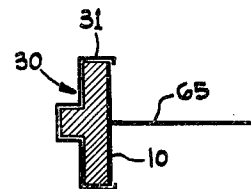


FIG. 15

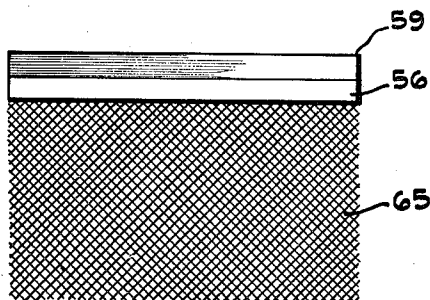


FIG. 12

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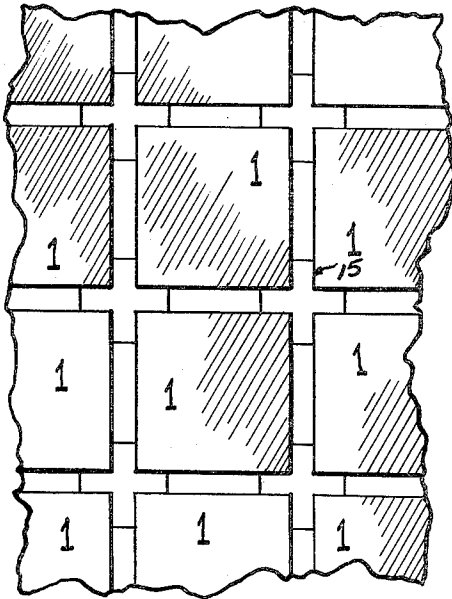


FIG. 18

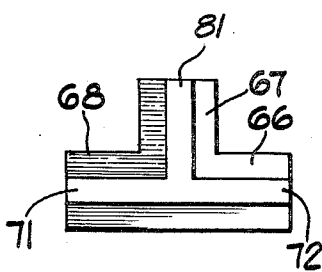


FIG. 19

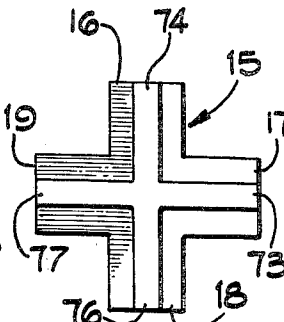


FIG. 20

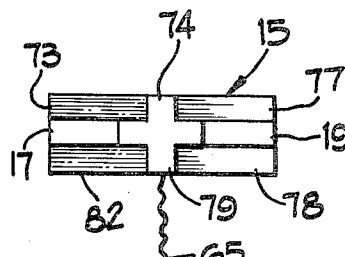


FIG. 21

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3,017,725

## SOLID GROUTING BAR AND HANGER ELEMENT FOR SETTING SLABS AND METHOD

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7 Claims. (Cl. 50-418)

This invention relates to a pre-formed solid grouting and hanger bar element adapted for use in water and weatherproof assembly of straight sided slabs of building material at least the adjacent peripheral edges of which are grooved or mortised.

More particularly this invention is directed to a solution to the problem of laying up walls of dense building materials including marble, glass, terra-cotta, vitreous tile, stone, etc., to provide a weather and water-proof wall of improved durability as to the supporting back wall, of enhanced physical appearance and requiring practically no maintenance, as periodic tuck-pointing, usually required, is done away with.

The problem heretofore met in facing building walls and exterior and interior walls of structures with extremely dense structural substances, illustratively granite and structural glass, has been the problem of fool-proof lay-up in the first instance, and water penetration into and through the mortar between adjacent slabs. Water so entering, when subject to repeated freezing and thawing, so deteriorates the nature of the supporting wall that slabs fall off and the supporting structure soon has to be rebuilt at considerable expense. Danger of heavy slabs falling into the street from heights makes rebuilding mandatory. Walls of granite, glass, terra-cotta, etc., are extremely attractive and the rectangular building elements themselves are practically ageless. It is believed that lack of a durable, strong, weatherproof method of hanging such facings to overlay less aesthetic load-bearing supporting means with an attractive facing has practically reduced volume use of these otherwise desirable building products to a practical standstill.

It is the general object of this invention to prove a solid grouting and hanger, preferably constructed of non-corroding load-bearing structural metal, adapted for use in weatherproof assembly of rectilinear slabs of building materials, at least the adjoining edges of which have been grooved or mortised.

It is a further general object of this invention to provide a new method for water and weatherproof assembly of a plurality of rectilinear slabs of building materials the peripheral edges of which are grooved or mortised by inserting a combination solid grouting and hanger element in a permanently plastic organic mastic or caulk in adjacent mortised edges of building slabs and to permanently affix an integral rearwardly-extending flexible anchor leg portion of the solid grouting element to a supporting structure.

The mode of achieving these and other related objects will be made more clear as the description of practical embodiments of my invention are developed in conjunction with the attached drawings in which:

FIGURE 1 is a front view of a fragmentary section of a wall face of rectilinear slabs in assembly with the solid grouting bar and hanger element of the invention in place.

FIGURE 2 is an isometric view of a rectilinear slab of

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building material as is essential to the ends of this invention.

FIGURE 3 is a front view of a fragmentary section of a wall face of rectilinear slabs, as in FIGURE 2, in assembly with the solid grouting bar and hanger element in a modified form.

FIGURE 4 is a plan view of the form of the invention as illustrated in FIGURE 3.

FIGURE 5 is a plan view of the form of the invention as illustrated in FIGURE 1.

FIGURE 6 is one modification of a sectional view through VI—VI of FIGURE 4.

FIGURE 7 is also a modification of the sectional form as viewed through a section of FIGURE 4.

FIGURE 8 is a similar sectional view as described for FIGURES 6 and 7, illustrating a preferred sectional view of the solid grouting bar and hanger of the invention.

FIGURE 9 is a side view of the invention as illustrated in FIGURE 4.

FIGURE 10 is similar to FIGURE 9, and is a side view of one of the modifications of the invention.

FIGURE 11 is a fragmentary sectional view along the line XI—XI of FIGURE 3.

FIGURE 12 is a side view of FIGURE 6.

FIGURE 13 is an additional front view of a fragmentary section of a wall-face of rectilinear slabs in assembly detailing a further feature of the invention.

FIGURE 14 is an enlarged front view of the solid bar grouting and hanger element in assembly as shown in FIGURE 13.

FIGURE 15 is a sectional view through FIGURE 14.

FIGURE 16 is a front view of a fragmentary wall section detailing the juncture of the rectilinear slabs of FIGURE 2 with the coping stones capping a parapet wall.

FIGURE 17 is a sectional view substantially along the line XVII—XVII of FIGURE 16 with one coping stone removed.

FIGURE 18 is a plan view in reduced scale of FIG. 1 showing assembly of the solid rectilinear slabs of building materials with a generally cruciform solid grouting and hanger element in combination with the solid bar grouting element of FIG. 4.

FIGURE 19 is a plan view of the generally cruciform solid grouting and hanger element as adapted for random assembly of rectilinear slabs.

FIGURE 20 is a plan view of the preferred cruciform grouting and hanger element as adapted for regular assembly of rectilinear slabs for the purposes of this invention.

FIGURE 21 is a side view of the element of FIGURE 20.

Referring more particularly to the drawings, a regular assembly of slabs of dense building materials 1 having their peripheral edges 3 grooved or mortised as at 2 is shown in FIGURE 1 held in spaced arrangement by a plurality of solid grouting and hanger bar elements 5, the load supporting structurally rigid and not manually bendable oppositely disposed primary pair of legs 6 and 7 of which act as tenons and are fitted into mortises 2 of adjacent slabs after the surfaces of the edges 3 and of the mortise 2 have been wetted with an organic caulking. A secondary leg 11 (and 22) also of load-bearing dimension is adapted to space the adjacent slabs of building material a standard distance apart, to share a part of the downward

load created by the assembly slabs, and to increase the length of path that moisture must travel in order to pass from the face of the slabs to the rear side of the slabs and into the supporting wall behind the facing created by the slab assembly.

The solid grouting and hanger element 5 illustrated in assembly in FIGURE 1 is cut at each end on exactly a 45° angle to form equilateral triangles 12 and 13 at each oppositely disposed end of the solid grouting bar. The equilateral triangle so formed has the secondary legs at the apices thereof. The length of the bar element 5 is determined by the width of leg 11 and the dimensions of the building slabs to be erected as can be seen from FIGURE 1. The length of the solid grouting element is such that when it is in assembly with elements of similar cross-section, the assembly is at least as long as the mortised slab edge.

Referring momentarily to the view along section line VI—VI, a number of modifications of the invention may be considered and made clear. FIGURE 8 illustrates a preferred modification in cross section of the solid grouting bar and hanger element 5 and 10. Note the two pairs of legs 22 and 14, and 20 and 21 each pair of which is at right angles to the other pair and each leg of which is of load-bearing dimension. Oppositely disposed legs 20 and 21 serve as tenons, fitting into the mortises in the peripheral grooves 2 of slabs 1. Oppositely disposed legs 22 and 14 may determine the space between adjacent slabs in assembly, and are of load-bearing dimension. In use, legs 22 and 14 aid in maintaining the slabs parallel to the supporting wall during construction. Extending rearwardly from the solid grouting element 10 is an additional tertiary leg 65 of yieldable or manually bendable dimension, adapted to be formed on the job to be fastened by a variety of means to load-bearing supporting walls, etc. The yieldable leg 65 is preferably made of expanded metal lath as illustrated in FIGURE 12, and may be scalloped as is shown in FIGURE 9. The yieldable non-rigid and manually bendable leg or anchor plate 65 may also be a light gauge steel plate (as in FIGURE 15) and may be stamped with holes 64 as illustrated in FIGURE 9. The yieldable rearwardly extending leg may also be an occasional rectangular stamped sheet, discontinuous along the rear side of the solid grouting bar as shown in FIGURES 10 and 17 or continuous as shown in FIGURE 12.

The legs in the section of the solid bar grouting element and the unit which combines therewith constituting generally a solid cruciform grouting element may be arranged as shown in FIGURES 6, 7, 8, 9, 10, 11, 15, 19, 20 and 21 although FIGURES 8, 9, 10, 11, 20 and 21 are preferred as stronger and more weather resistant modifications.

FIG. 19 details a modification used in random assembly of the generally cruciform solid grouting having three arms 66, 67 and 68 of rigid, structural, not manually bendable and load bearing dimension lying in the same plane, of the same width and of the same cross arm end sectional pattern. Two of the arms 66 and 68 are oppositely disposed and a third arm 67 is at right angles to the oppositely disposed pair. The modification 15 of FIGURE 20 has four arms of load bearing dimension 16, 17, 18 and 19 having two pairs of oppositely disposed arms 16 and 18 and 17 and 19 at right angles to one another all arms identified of the same width and thickness.

In the forms of the invention illustrated in FIGURES 19 and 20, there is superimposed upon the front and rear face and axially aligned with each of said first arms a corresponding second set of arms of diminished but none-the-less, rigid structural, not manually bendable and load bearing width identified as 71, 72 and 81 in FIGURE 19 and 73, 74, 76 and 77 in FIGURE 20. A like set of arms is on the reverse face of the elements of FIGURES 19 and 20.

FIGURE 21 illustrates a side view of FIGURE 20

showing the like set of arms 78, 79 and 82 on the reverse face of the cruciform grouting 15.

When the slabs and the solid grouting bar tenons are in approximate final position, the solid grouting bars are wetted or struck with the organic caulk along the apices of the meeting sides of the equilateral triangles 12 and 13 and the four units brought into contact to form a cross as shown at 15a and 16a. Excess caulk is wiped off to give a seal, yet provide sufficient tolerance between adjacent grouting elements 5 when they meet as at 16a to take up the expansion and contraction of the metal grouting bar 5.

In a preferred assembly utilizing the solid grouting and hanger element of this invention as illustrated in FIGURES 3, 4, and 18 the solid bar grouting and hanger 10 is cut to determine its length at right angles to its longitudinal axis. In the assembly shown in FIGURES 3, 18, 19 and 20 a special solid grouting and hanger element of generally cruciform shape in both its plan and section (see FIGURES 18, 19 and 20) identified as 15 is used in conjunction with solid grouting and hanger bar 10. In laying up a plurality of slabs 1 as in FIGURES 3, 16 and 18 in both a horizontal and vertical dimension to create a weatherproof wall facing of, for example, granite slabs the following method is used.

The mortised edges 3 of the slab as in 1 are wetted or filled with organic caulk. An appropriate length of solid grouting 10 is cut at right angles so that its length and the length of the arms 16, 17, 18 and 19 of the cruciform element 15 fit together as shown in FIGURE 3. Some slight gap should be considered for expansion and contraction of the metal bar elements. Assume for illustration that slabs 1a and 1b are in place along with solid grouting bar 10a cut as shown. The top horizontal mortises of slabs 1a and 1b are wetted or struck with organic caulk and the cruciform element 15 (whose cross arms 16, 17, 18 and 19 have cross-arm end-sections as illustrated for the solid bar section in FIGURE 8) arm end 18 is pushed downwardly sliding oppositely disposed legs 20 and 21 between adjacent blocks 1a and 1b and in the mortises adjacent thereof until arm 18 contacts the upper end of solid bar grouting 10a. A rearwardly extending leg of yieldable dimension, similar to leg 65 in FIGURE 12, is bent upwardly at its free end and fastened to the supporting wall. (A gun capable of firing studs into concrete is useful.) Solid grouting and hanger bar element 10 in FIGURE 4 (shown as 10a, 10b, 10c and 10d in FIGURE 3), having a section as shown in FIGURE 8 are oriented so that the legs 20c and 10d are set in the mortise of slabs 1b and 1a respectively. After the solid grouting elements 10c and 10d are snugly in place the yieldable rearwardly extending legs similar to leg 65 of FIGURE 12 are bent over at a 90° angle and permanently fastened to the supporting means rearwardly of the facing under erection.

Edges 3 and mortises 2 of slabs 1c and 1d are struck with caulk and the mortise of slab 1d brought home over leg (tenon) 21d of solid grouting bar element 10d. Leg 20b of solid grouting element 10b is then set into the mortise of slab 1d and the yieldable rearwardly extending leg (corresponding to 65 in FIGURE 12) bent over at its free end away from slab 1d is fastened by firing nails through it into the leg end and the supporting wall. Thereafter, the mortise 2 of slab 1c is brought down over leg 21c of solid grouting 10c and slid toward slab 1d to fit its vertical mortise adjacent solid grouting 10b over leg 21b, and the adjacent tenon-like legs of the cruciform hanger 15 in position to enter both horizontal and vertical mortise 2 of slab 1c. The process of assembly, as described, is repeated in both a horizontal and vertical plane to complete facing the wall with a water impermeable solid facing of dense building material. Leg 22 and leg 14 of the solid grouting element 10 act as a solid grouting to space the slabs, both in their horizontal and vertical courses. When the face of leg 22 is of burnished

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metal, unusually attractive combinations and wall design are possible.

In some instances it is desirable that the joint between the solid bar grouting element 10c and arm 17 of the cruciform solid grouting element 15 be further protected from the potential of moisture entering the crack essential to expansion between adjacent ends of solid bar grouting. In other cases, where the slabs of building material may be quite long, joints between adjacent solid bar grouting elements as 10 also need additional protection from the weather. This is provided by a clip element 30 shown in place over the meeting ends of two solid grouting bar elements 10 in FIGURE 14. FIGURE 15, in section, details clip 30 as a thin sheet formed so that its peripheral section is of similar contour to that of the cross-section of solid grouting element 10. FIGURE 13 details clips 30 in place when the cruciform element 15 and the solid grouting bar 10 are used in combination. In using the clip 30, it is slid over the one end of one arm of the cruciform element 15, and the adjacent solid bar 10, in turn, slid into open end of clip 30. Clips must be positioned between the solid bar ends 10 or bar 10 and cross 15 arms 16, 17, 18 and 19 before the weight of the slabs are allowed to press against clip 30 ends 31, otherwise assembly is most difficult. Once all slabs are in position as shown in FIGURE 13 movement of clips 30 are most difficult if not impossible. By means of use of clips 30 over the meeting and mating joints the potential of moisture getting through to the supporting wall is completely eliminated and no caulk joints are then visible.

A specialized form of the invention is detailed in FIGURES 10 and 11 wherein the solid grouting element 40 is notched along its length in the two oppositely disposed legs 42 and 43 which serve as tenons. Notches 44, assure flow of the semi-fluid caulk freely about the solid grouting element 40. Both flow of caulk and spacing of the tenon-acting legs 42 and 43 is aided by the buttons 45 which are pressed into legs 42 and 43 in alternating and opposite direction. Seating of the tenons or legs 42 and 43 is thereby simplified and less play is faced in the joint during assembly than is otherwise necessary.

A further application of the invention is detailed in FIGURES 16 and 17 which illustrate its use in setting coping stones upon the top of a parapet wall 63 in a more or less conventional building construction. As the method is particularly adaptable when remodeling older structures with new facings, as is one principal intent of the invention, this additional improvement at the same time is also desirable in order to eliminate the moisture problem from faulty grouting between coping stones.

Of greatest explanatory value is FIGURE 17 which is a sectional view along the line XVII—XVII of FIGURE 16 showing the top course of solid slabs as in FIGURE 2 in place, utilizing the herein described invention as said slabs meet with the coping stones topping supporting masonry wall 63. A groove or mortise 50 extends horizontally parallel with and a few inches rearwardly of the front face of coping stones 51 and 52 along and upwardly in stone base 53. This groove or mortise 50 accepts the upwardly extending tenon or leg 70 of the cruciform solid grouting elements of three arms 55 of the type shown in FIGURE 19. Each adjacent end of the coping stones 51 and 52 are further grooved or mortised, as illustrated in mortise 60 so that adjacent mortises in coping stone ends 75 and 80 are mirror images of one another. A solid grouting bar having a cross-section as shown in FIGURE 6 is fabricated so that the legs 57 and 58 thereof fit into the oppositely disposed (mirror image) mortises 60 of adjacent coping stones 51 and 52 ends 75 and 80. Leg 59 faces outwardly and upwardly to provide a solid grouting and spacing element between coping stones 51 and 52. Leg 58 sets into groove 60 of end 75 of coping stone 51. The area indicated as 57 delineates the corresponding tenon-like leg 57, with coping stone 52 removed. To avoid possibility of shifting due to high winds catching

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under the stone (or malicious mischief) a leg 65 rearwardly extending from the solid grouting bar element in mortise 60 is extended and forced into a void left in the parapet wall during construction the void freshly filled with mortar in a plastic state prior to setting the coping stones. Additionally, the groove 60 and corresponding mirror groove in the adjacent coping stone end 80 are wetted with an organic caulk prior to assembly of legs 57 and 58 of the solid grouting element into the coping stone end grooves or mortises. The holes 64 of and in the yieldable anchor plate 65 when set in the said fresh mortar at the time of laying up the coping stones provide excellent bonding with the parapet wall 63 itself.

As can be visualized from the sectional view of FIGURE 17, no matter how hard the wind and rain may blow, moisture is excluded from entering through faulty seal in the coping stones or from the installed slabs of facing material immediately adjacent thereto.

Having thus described my invention, what I claim is:

1. A combined solid metal grouting and hanger unit adapted for use in water-tight and strain-free assembly of a plurality of veneer-like, rectangular facing slabs whose edges are fully mortised and which slabs are non-load bearing in spaced apart relation and assembled from a load bearing wall structure; said grouting unit comprising a grouting strip of cruciform cross-section and load-bearing non-yielding, structurally rigid dimension; the vertical pair of oppositely disposed legs of said cruciform cross-section of such width as to be slideably insertable as tenons in adjacent mortises of adjacent slabs when assembled and the depth thereof to substantially fill said mortises, and a horizontal pair of oppositely disposed legs of said cruciform section integral with said vertical pair of legs, the thickness of the horizontal legs defining substantially the distance apart of adjacent slabs in assembly; the horizontal faces of the horizontal pair of legs and the vertical faces of the vertical pair of legs and the length of said grouting strip forming an extended and complete seal between the front and rear faces of said slabs in assembly; and extending outwardly from the rearward face of the horizontal leg of said cruciform grouting strip a manually bendable anchor and plate hanger means the extension of said anchor and plate hanger being such that the free end thereof may be readily deformed for attachment to load-bearing supporting wall means, to permit differential shifting by way of settlement of the load bearing wall without transfer of the full strain thereof to the assembled facing slabs of the non-load bearing wall, and to permit slap assembly with the free end of said anchor means fixed in the load bearing wall.

2. The product of claim 1, wherein the manually bendable anchor and plate hanger means is expanded metal lath.

3. The metal grouting and hanger unit of claim 1, wherein the length of the metal grouting strip is in excess of the mortised slab edge and each end thereof terminates in an equilateral triangle with the horizontally disposed legs at the apices thereof.

4. The product of claim 1, wherein the manually bendable anchor and plate hanger means is a length of perforated metal.

5. A solid metal grouting and hanger adapted to use with associated elements of similar section in water-tight assembly of a plurality of veneer-like rectangular, non-load bearing edge-mortised slabs in spaced apart relation from a load bearing wall which comprises a load bearing structure of generally cruciform pattern in both its plan and cross-arm end section; the plan thereof comprising four first arms lying in the same plane each arm thereof of the same width and thickness, a first pair and a second pair each arm of each pair of which is oppositely disposed and the first pair at right angles to the second pair of arms; centrally superimposed on both the front face and rear face of said cruciform plan a second and third set of cross arms in axial alignment said arms

of the same length, but of diminished width, as compared with the arms of the first described cruciform plan; the cruciform cross-arm end section of each of said arms comprising in turn four legs, a first pair and a second pair each leg of each pair of which is oppositely disposed and the first pair at right angles to the second pair of legs, the oppositely disposed first pair of legs adapted to be inserted as tenons between the mortised edges of adjacent slabs and the second pair of legs adapted substantially to occupy and define the space between the non-mortised front and rear edges of adjacent slabs when said slabs and herein defined hanger elements are in final assembly; all of said arms and legs of non-yielding, structurally rigid, load bearing dimension; and substantially along the center line of one pair of rearwardly extending legs and substantially at right angles to the plane of said arms attached and extending rearwardly from said line of said rigid cruciform structure a manually bendable anchor plate means of yieldable dimension of sufficient length to suspend the load-bearing cruciform

structure at a spaced distance from and its free end to load-bearing supporting means.

6. The product of claim 5, wherein the anchor plate means is a length of perforated metal.

7. The product of claim 5, wherein the perforated metal is expanded metal lath.

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