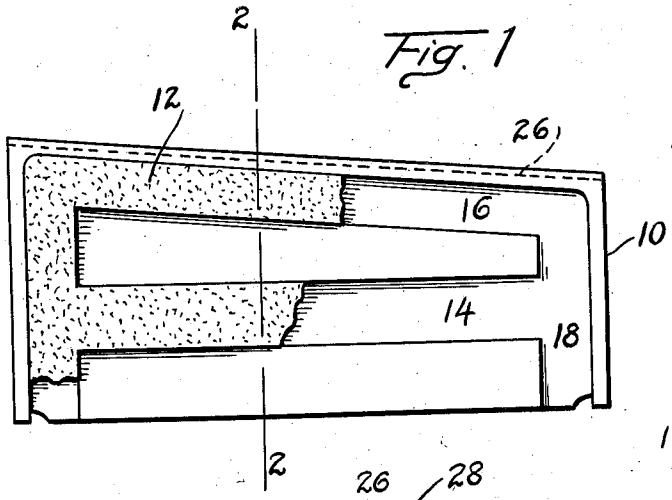
Feb. 5, 1935. W. GRUND 1,990,323

STRUCTURAL EXPANSION UNIT

Filed Sept. 4, 1931

Fig. 1



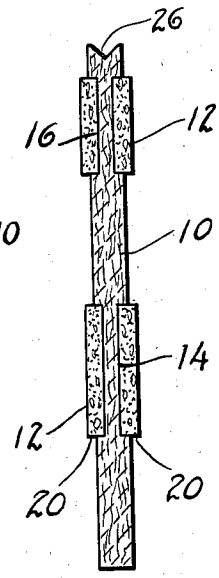


Fig. 2

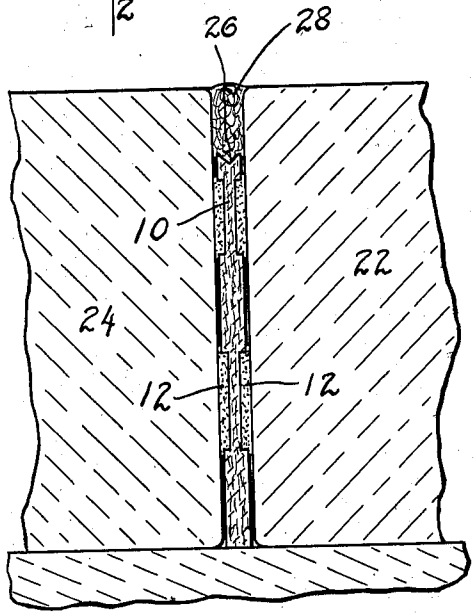


Fig. 3

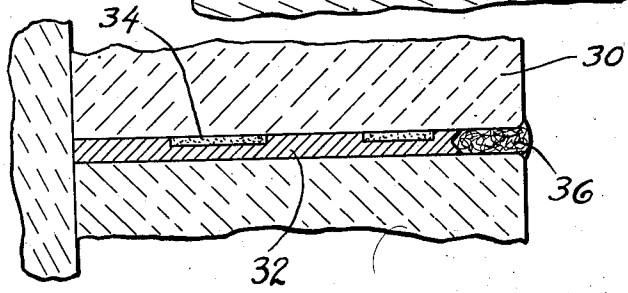


Fig. 4

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1,990,323

STRUCTURAL EXPANSION UNIT

William Grund, Detroit, Mich.

Application September 4, 1931, Serial No. 561,222

16 Claims. (Cl. 72—106)

My invention relates to what may be regarded as an expansion unit adapted to be utilized in lieu of the customary solid mortar or cement filler joints.

Hitherto it has been the general practice in laying stone copings, cornices, sills, et cetera, as well as in brick, marble, and other masonry work, to fill the joints or crevices between these units with solid mortar or cement. The result has been that the expense of building maintenance has been excessive due to the fact that frost and moisture filtered in through such porous filler material, ultimately resulting in cracked and damaged masonry. The moisture which is permitted to so enter between the masonry joints freezes and consequently expands, loosening and cracking the exterior masonry and rapidly resulting in disintegration.

An object of this invention is to eliminate the heavy maintenance cost necessitated by such cracking and disintegration. In so doing I contemplate the use of a composite expansion sheet or panel which will permit the adjoining masonry units to contract and expand naturally with the shifting temperatures and which is impervious to the ingress of moisture. This sheet is to be substituted for the mortar or cement fillers now placed between the masonry units and constitutes a water tight sealing joint of an efficient and durable nature.

Another object of the invention is to make this expansion sheet of a composite nature, one component of which provides the necessary elasticity to absorb the expansion and contraction resulting from temperature changes, the other component of which may be substantially rigid and of a strength comparable with the cement or mortar fillings customarily used in such places.

Still a further object is to provide an inexpensive structure easy to manufacture and assemble which will not add materially to the present cost of laying masonry of the type above described.

Various other meritorious features of the invention will be apparent from the following description taken in conjunction with the drawing wherein:

Fig. 1 is an elevation, partly broken away, of my improved composite sheet,

Fig. 2 is a section along 2—2 of Fig. 1.

Fig. 3 is a vertical section showing the use of the improved unit between two copings, and

Fig. 4 illustrates a somewhat modified form of expansion unit supporting a sill.

The two component elements of my improved structural unit comprise a frame element 10 and a gasket 12 which is associated with the frame in the manner illustrated in Figs. 1-3.

The frame is a substantially rigid structure and should be of a strength comparable with that of hardened mortar or cement. While I do not intend to prescribe any specific material which is essential, this frame may well be made of such a composition as ebony wood. This material, however, is in no wise essential and any suitable composition utilizing such basic materials as cement, asbestos, asphaltum, et cetera, which will provide the necessary physical characteristics of strength and rigidity may be utilized. While strength and rigidity are essential, the composition should likewise be moisture proof or substantially so. For certain purposes I have found that lead, provided it has sufficient rigidity and strength, is a suitable material from which to form the frame, particularly in certain types of joints where it is desirable that the frame be capable of some expansion and contraction to conform with the gasket material.

The surface of the frame is cut away on each side thereof as indicated at 14, 16, and 18 to provide a seat for the gasket material 12. While no particular form or design for this cut away portion is essential, it is preferable that the cut away portion include a substantial portion of the area of the frame 10 and that the particular delineations provide sufficient seat portions extending at angles to one another, such as the two horizontal portions 14 and 16 and the vertical portion 18, to firmly anchor the gasket. The frame is of the same peripheral contour as the adjacent side surfaces of the masonry units between which the expansion joint is to be positioned. As indicated in Figure 3 of the drawing, the depth of the joint is somewhat less than that of the masonry units, such as coping blocks, cornices, et cetera, to provide a relatively shallow outer crevice beyond the edges of the frame upon all sides except that side which is to constitute the base of the frame and upon which the unit is to rest. This relatively shallow unfilled crevice is subsequently filled in with water proofing material to provide a neat exterior joint along the entire visible line of juncture.

It is important to position a continuous recess composed of intercommunicating cut away portions around the entire margin of the frame, as clearly indicated in Figure 1, spaced slightly inwardly from the peripheral edge thereof, this marginal recess extending on through the edge of the frame which is adapted to form the base

thereof. When the elastic gasket material is positioned in this marginal recess the infiltration of moisture from both ends as well as the top of the joint is prevented. The cut away portion 14 may be positioned as desired to communicate with the marginal recesses, but it should be spaced therefrom to provide a secondary seal along an intermediate portion of the unit.

The gasket material 12 is positioned in the cut away portions adapted to form a seat therefor on each side of the frame and should be of a thickness which will insure its extending beyond the surface of the frame, as at 20. While no particular dimensions are specified herein it has been found that it is desirable to have the gasket project about $\frac{1}{16}$ of an inch beyond the surface of the frame 10.

This gasket may be formed of any suitable material which possesses the necessary physical characteristics. The gasket material should have a substantial amount of elasticity to permit contraction and expansion with the masonry surfaces between which it is interposed and should possess sufficient adhering qualities to form a moisture proof seal with the adjacent surfaces which bear against it. A substance which has been found suitable for use in this connection comprises a composition of ground asbestos, china clay, whiting, a pigment formed of granulated slate flour, any one of a number of non-drying adhesive oils such as linseed oil, and a certain proportion of any type of well known gum, such as wax gum.

As clearly illustrated in Fig. 3 the composite unit is inserted between the spaced apart copings 22 and 24. In such type of construction the unit is adapted to rest in a vertical plane and it will be seen that the flexibility of the gasket 12 permits ready conformation of the sheet as a whole to any contraction or expansion which may take place in the copings as the result of temperature changes. The gummy substance and the adhesive oil in the gasket forms a moisture proof seal between the copings and the improved unit which prevents the ingress of moisture and the resultant cracking and disintegration of the masonry.

The upper extremity of the frame 10 is provided with a channel 26 which is adapted to seat any suitable type of caulking material 28. The caulking material is inserted between the copings 22 and 24 after the improved expansion sheet has been positioned therebetween and serves the purpose of providing additional security against the ingress of moisture while at the same time enhancing the exterior appearance of the masonry work.

Hitherto it has been customary to lay the masonry units as indicated in Figure 3 and to fill the crevices therebetween with mortar up to a point short of the visible exterior line of juncture. The joints so formed are usually left in the condition above indicated for a long period of time until the so-called "pointers" come on the job to fill in the relatively shallow peripheral crevices with some kind of water proofing or caulking material as indicated at 28. In the majority of instances this unfilled shallow crevice is left in its uncaulked condition for a month or more and during such time dampness and change in temperature seriously deteriorate the mortar joint. The simplicity of inserting my improved expansion joint between the adjacent masonry units will be apparent. It will be further apparent that there can be no ingress of moisture and subsequent cracking and disintegration of the joint before the caulking material 28 is finally put in.

In Fig. 4 I have illustrated a somewhat different type of expansion sheet and have shown it in horizontal position supporting a sill 30. Where the unit is to be placed in a horizontal position as a support it has been found desirable to provide a gasket upon one side only of the frame. This insures a more firm seat for sill 30. Under such circumstances its has been found desirable to utilize a frame 32 formed of metal such as lead, possessing a relatively large coefficient of expansion and contraction, and to seat the gasket 34 in the one face thereof so that it lies flush with the surface of the frame. One face of the frame 32 is cut away in the same manner as hitherto described in connection with Fig. 1 and the gasket material 34 positioned therein to lie flush with the upper surface. A filler of caulking material 36 is utilized to fill in the outer portion of the crevice, as hitherto described.

Although primarily reference herein has been made to the use of my improved expansion sheet in conjunction with masonry work, it will be understood that the structure illustrated and described is equally applicable in conjunction with any building materials which are subject to contraction and expansion due to temperature change or any other cause. It lies quite within the obvious realm of utility to use such structure as is claimed in conjunction with joints between metal units, wood units, or between metal and wood. In other words, I do not wish it understood that the invention is applicable only to masonry work.

While I have described and illustrated certain preferred forms of my improved structural unit various modifications thereof will be apparent to those skilled in the art and for that reason I intend to limit myself only within the scope of the appended claims.

What I claim is:

1. A building unit of the class described comprising a substantially rigid frame having a strength comparable to cement and being substantially moisture proof, cut away portions in the face of said frame, and gasket material of an elastic substance possessing adhesive qualities imbedded in said cut away portions.

2. A building unit of the class described comprising a substantially rigid frame having a strength comparable to cement and being substantially moisture proof, cut away portions in the face of said frame, and gasket material of an elastic substance possessing adhesive qualities imbedded in said cut away portions and extending beyond the face of the frame.

3. A structural assembly comprising a pair of masonry units positioned in spaced relationship to one another to provide a crevice therebetween, and a sheet of somewhat less depth than said units having a rigidity comparable to cement or mortar, and including elastic projecting portions, interposed within said crevice, said projecting portions being spaced slightly inwardly from the entire peripheral edge of the sheet and adapted to bear against the adjacent surfaces of said masonry units to flex with the contraction and expansion thereof.

4. A building unit of the class described comprising a relatively rigid frame having cut away portions in the interior of each surface thereof, and a gasket of yieldable substance imbedded in

said cut away portions, said frame including a channel extending along one edge thereof throughout the major portion of its length.

5. A building unit of the class described comprising a relatively rigid frame having cut away portions in each surface thereof, a gasket of yieldable substance imbedded in said cut away portions and extending somewhat beyond the surfaces of the frame, said frame including a channel extending along one edge thereof throughout the major portion of its length.

6. A building unit of the class described comprising a frame of relatively rigid material having cut away portions disposed in the interior surface thereof, gasket material of relatively permanent elasticity positioned in said cut away portion and extending beyond the outer surface of said frame, said gasket material being adhesive, and a channeled portion extending along one edge of said frame.

7. In masonry construction, the combination of two adjacent masonry units, a waterproof expansion joint arranged therebetween, said joint having elastic side faces in intimate face to face contact with the adjacent face of said masonry units and a rigid peripheral edge, said edge terminating short of the exposed edges of said units, and waterproof caulking material sealing the exposed crevices so formed.

8. In masonry construction, the combination of two adjacent masonry units, a waterproof expansion joint arranged therebetween, said joint having elastic side faces possessing adhesive characteristics in intimate face to face contact with the adjacent face of said masonry units and a rigid peripheral edge, said edge terminating short of the exposed edges of said units, and waterproof caulking material sealing the exposed crevices so formed.

9. An expansion joint of the class described comprising a substantially rigid frame, a recess extending around the margin of the frame in spaced relation to the peripheral edge thereof and extending through that portion of the edge adapted to form the base of the unit adjacent opposite ends thereof, and elastic gasket material positioned in and by said recess.

10. An expansion joint of the class described comprising a substantially rigid frame, a recess extending around the margin of the frame in spaced relation to the peripheral edge thereof and extending through that portion of the edge adapted to form the base of the unit adjacent opposite ends thereof, an additional recess intercommunicating with spaced portions of said first mentioned recess, and elastic gasket material positioned in and by said recess.

11. A waterproof expansion joint insertable between adjacent structural units comprising a rigidifying base structure having on opposite sides an expandible and contractible layer of an elastic gum composition having adhesive outer surfaces adapted upon insertion between adjacent structural units to adhere at all times to the surfaces thereof to prevent the entrance of moisture therebetween and adapted to expand and contract with the expansion and contraction of the structural units.

12. A waterproof expansion joint insertable between adjacent structural units comprising a rigidifying base structure having extending from either surface adjacent the peripheral edge thereof an expandible and contractible adhesive gum composition, said gum composition adapted upon insertion of the expansion joint between structural units to expand and contract with the expansion and contraction of the structural units and to adhere at all times to the contacting surfaces thereof to prevent the entrance of moisture therebetween.

13. A waterproof expansion joint insertable between adjacent structural units comprising a substantially rigid base structure, a continuous unbroken body of fibrous gum composition having permanently pliable and permanently adhesive qualities interlocking with said base structure adjacent the peripheral edge thereof, said pliable adhesive gum composition adapted upon insertion of the joint between adjacent structural units to adhere at all times under all conditions of expansion and contraction to the adjacent surfaces of the structural units to form a barrier to the ingress of moisture therebetween.

14. In a structure, the combination of two adjacent structural units, a relatively rigid frame arranged between the adjacent structural units having an edge terminating short of the exposed edges of said units, said frame provided with channels on the opposite surfaces thereof, bodies of elastic adhesive material positioned in said channels and extending from the channels beyond the surfaces of said frame to adhesively contact with the adjacent surfaces of said structural units, and caulking material disposed between the exposed edges of the structural units beyond the terminating edge of the frame sealing the exposed crevice so formed.

15. In a structure, the combination of two adjacent structural units having a slight space therebetween, a relatively rigid panel of less width than said space arranged between said structural units spaced from the adjacent surfaces thereof, said panel provided with recesses in each of its surfaces, and a raised body of elastic adhesive material extending in a continuous unbroken ridge along either side of said panel having portions of its body adhesively imbedded in said recesses and other portions of its body extending outwardly beyond the sides of the panel to adhesively contact with the adjacent surfaces of the structural units, said body of material being of such an elastic adhesive composition as to adhere to the panel and to the adjacent surfaces of the structural units under all temperature conditions and to stretch and contract at all times in conformity with the variations in the width of the space between said structural units resulting from the expansion and contraction of the latter as they are affected by temperature changes whereby a permanent moisture-proof seal is provided in the space between the structural units.

16. A waterproof expansion joint insertable between adjacent structural units comprising a relatively rigid base structure having a channel formed in the surface thereof, and a body of adhesive and elastic gum material positioned in said channel having its outer portions extending beyond the side walls of the channel, said body of gum material being of such a composition that it retains its elasticity and adhesiveness under all temperature conditions of the weather.

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