Sept. 6, 1938. H. A. FABER 2,129,369

STRUCTURAL UNIT

Filed June 8, 1937

Fig. 1.

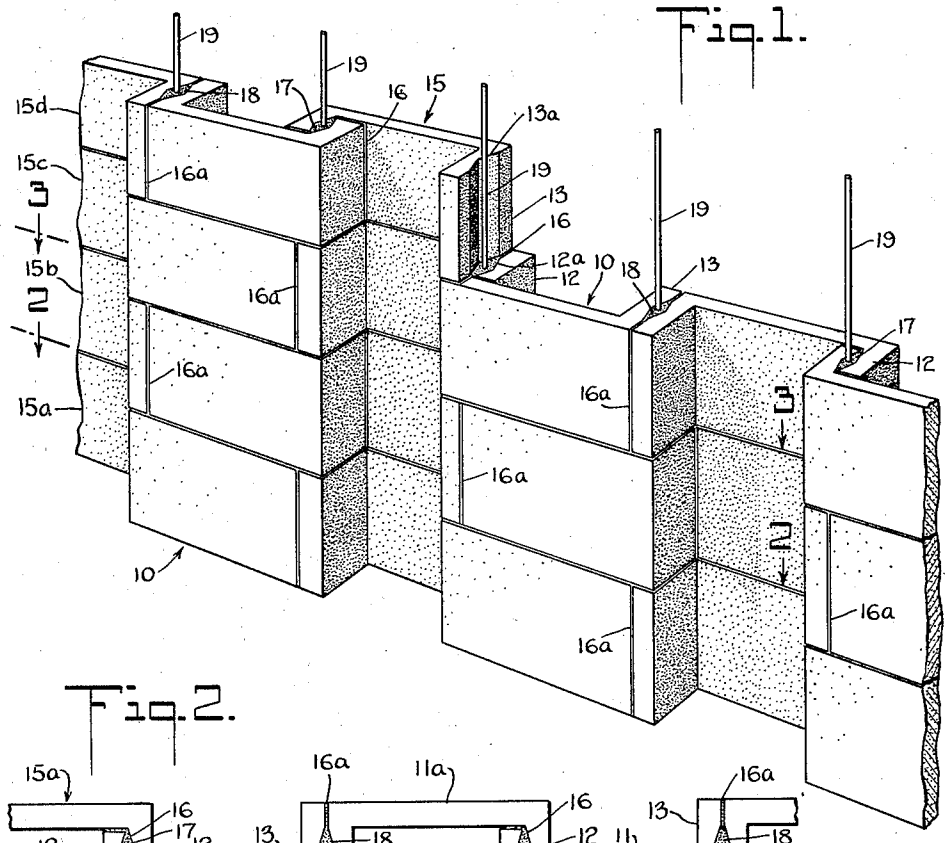


Fig. 2.

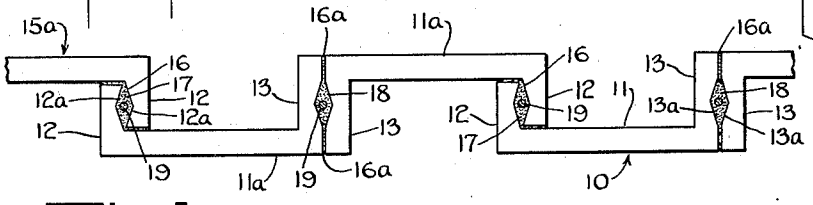


Fig. 3.

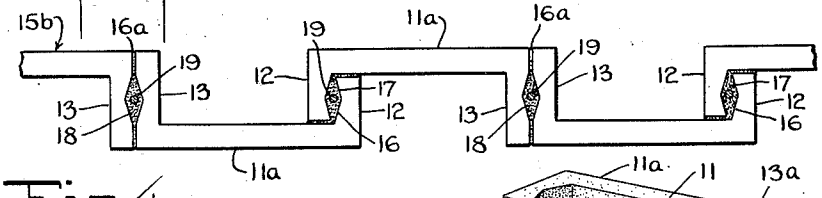


Fig. 4.

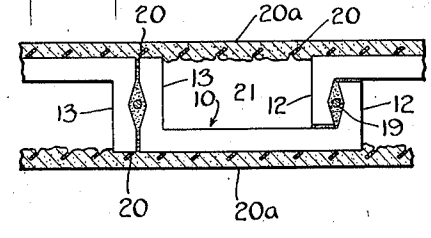
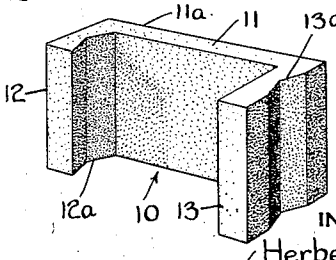


Fig. 5.



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STRUCTURAL UNIT

Herbert Alfred Faber, Cincinnati, Ohio

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4 Claims. (Cl. 72—30)

This invention relates to building construction, and in particular to an improved, prefabricated, structural unit.

It is an object of this invention to provide improved means for erecting a load-bearing partition wall, such for example, as a residence basement partition, which must carry the load imposed by the superstructure. It is a desideratum of such a partition that it be erected at a low cost; that it be fire retardent; and that one or both sides of the partition be adaptable to suitable finishing or decorative treatment.

It is a further object of this invention to provide a channel-shaped structural unit which can be so bonded or joined to contiguous units that vertical reinforcement means can readily be employed, and which, when assembled into a masonry course, provides the maximum reach or extent of the said course consonant with structural strength and stability.

Yet another object is to provide a structural unit which can easily be assembled into a wall structure of balanced strength, i. e., a structure in which the imposed load is carried equally on both wall faces thereof.

Channel- or U-shaped blocks are not new in the building art, but such blocks have been characterized by uniform extension of the flanges from the web. In assembling such blocks or units into a masonry course, it is obvious that the flanges of adjacent units may either be placed in outer face to outer face opposition or in overlapping or interlocking relationship. The first method, although utilizing the full length of each unit to give maximum reach to the masonry course, forms a course which is structurally weak at the joints. The continual overlapping at the joints in following the second structural method foreshortens the course, and thus adds to the expense of the wall structure.

It is, therefore, a feature of the present invention that the flanges, extending at the ends of the web-portion angularly from its outer face, are not of the same length, and that in assembling the units into a masonry course, only the shorter flanges of contiguous units are overlapped, with the terminal end surfaces of the flanges facing the inner surface of the web of a complementary unit.

A second feature of this invention is that the difference in length of the two flanges is greater than the thickness of the web-portion. In forming the masonry course, the longer flanges of adjacent units are placed with their outer surfaces in coextensive opposition and in parallel relationship. It will thus be obvious that the terminal ends of the short flanges will be spaced from the webs toward which they extend. The space may be closed with a filling of mortar, making the mortar bond at the interlocked, shorter, flanges substantially equal in area to that at the joint formed by the opposing long flanges.

Each pair of flanges thus forms a load-supporting stud of substantially equal strength and bearing area; and further, the web-portions of the channelled units form co-extensive walls on each side of the studs, each wall carrying an equivalent portion of the total load.

The flanges of the units are formed with vertical, preferably angular, grooves. In erecting successive courses of the wall, the units are laid in such manner that opposing-long-flange and interlocked-flange joints alternate throughout the full height of the wall structure. Grooves of adjacent flanges align to form a vertical passageway, which in each course registers vertically with the lower course. The vertical keyway thus formed may be utilized to accommodate vertical structural reinforcement.

The adaptability of the structural unit to this method of assembly into a wall marks an additional feature of this invention; namely, that the extended reach of the wall is accomplished at no sacrifice of structural strength. An opposing-long-flange joint, presumably weak in tensile strength, is supported above and below by an interlocked joint possessing great resistance to forces inducing tensile stress. The wall structure is similarly resistant to compression, and the entire wall is characterized by its resistance to the formation of cracks or fissures occasioned by expansion or contraction.

These and other features will hereinafter appear.

In the accompanying drawing:

Fig. 1 is a perspective, showing the assembly of channel-shaped structural units into courses of a completed wall, and additionally showing vertical structural reinforcement.

Fig. 2 is a plan section, taken through 2—2 of Fig. 1.

Fig. 3 is a similar section taken through 3—3 of Fig. 1, and representing the next higher course above that of Fig. 2.

Fig. 4 shows the use of surfacing material to impart wall continuity.

Fig. 5 is a detail, in perspective, of the structural unit.

Referring to Fig. 5, 10 represents a structural

unit, precast or otherwise prefabricated of concrete or similar moldable structural material. The unit 10 is preferably rectangular in front elevation, and has a web 11 with flanges 12, 13 projecting from the ends thereof, at preferably right angles to the plane of the web. The outer surface 11*a* of the web may have a smooth or textured finish.

It is a feature of this invention that the flanges 12, 13 are substantially equal in all dimensions except outward extension from the face 11*a* of the web. It is an additional feature that, as shown in Figs. 2 and 3, the difference in outward extensions of the flanges is greater than the thickness of the web 11. The inner surface of the flange 12 and the outer surface of flange 13 are preferably formed with a vertical groove, as at 12*a* and 13*a* respectively, the median lines of the grooves being equidistant from face 11*a*.

In erecting a masonry wall, it has been the immemorially old practice to "break" the vertical joints between successive courses by staggering the bricks or other structural units in one course with respect to those in a lower course. With the improved structural unit 10, the vertical joints between courses are made secure, and the faces of the wall bonded, in a novel manner.

Referring to Fig. 1, a masonry wall 15 is represented as having four courses, 15*a*, 15*b*, 15*c*, 15*d*, the respective courses being formed of units 10 so laid that the shorter flanges 12 of contiguous units overlap or interlock. The flange 13 of adjacent units are coextensively opposite each other. As the depth of the flanges 12 is less than that of the flanges 13 by slightly more than the thickness of the web 11, the terminal ends of the flanges 12 will be spaced from the inner surface of the webs 11 toward which they extend.

The units 10 are laid in mortar, and bonded to adjacent units with mortared joints. Also, mortar is used to close the space between the flanges 12 and the webs 11. A roughly Z-shaped joint 16 is formed by the flanges 12, this joint having a cross-sectional area practically equal to the cross-sectional area of the joint 16*a* between flanges 13 of adjacent units. In this construction, the joints 16, 16*a*, may be considered to be of approximately equal strength in vertical shear.

A wall constructed with vertical joints, as 16, 16*a*, in vertical continuity throughout all of its courses would be structurally deficient, as it may be assumed that joints 16*a* are weak in tension, and that joint 16 could be opened by sufficient horizontal pressure oppositely directed at the ends of a course. Such tensile and compressive stresses might be the result of the expansion and contraction of the course after its erection. This structural deficiency is overcome without the necessity of staggering the units, by the simple expedient of reversing the relative position of the joints 16*a* with respect to lower and upper courses, as shown in Figs. 1, 2, and 3. Joints 16, 16*a* thus alternate throughout successive courses, and the continuity of vertical joints is effectively broken.

A comparison of Figs. 2 and 3 shows that the total bearing or vertical-load-carrying area of two adjacent flanges 13 is substantially equivalent to the bearing area formed by the interlocked flanges 12. Each cooperating pair of flanges forms stud-sections of comparatively equal load-bearing capacity, and in the completed wall, as shown in Fig. 1, the stud-sections formed alternately by flanges 13 and flanges 12 register in vertical alignment to form a continuous load-bearing structure.

As the vertical grooves 12*a*, 13*a*, are centered in the respective flanges, it will be obvious that grooves in contiguous units will cooperate to form keyways 17, 18, and that these keyways will alternately vertically align to form a keyway coextensive with the height of the stud. This construction will accommodate vertical steel reenforcement members 19. The placing of the said members may be deferred until several courses are erected, with all mortar joints made except the fill of the keyways. The bars 19 can then be dropped into place and permanently secured by grouting. Final courses can then be laid. Preferably, the members 19 project above the final course, to the end that a structurally good juncture with the superstructure (not shown) can be made.

The units 10 may be of any conveniently handled size. By alternating an interlocked joint 16 and an outer-face to outer-face joint 16*a* in a masonary course using the units 10, a greater reach or extent of the said course is secured than would be possible if all joints were of the interlocking type; and greater strength is secured than if all joints were of the form of 16*a*. By alternating joints 16, 16*a* in successive courses, the extended reach of each course is accomplished without sacrifice of wall strength. The said joints are mutually reenforcing against expansion and contraction strains and the formation of fissures induced by such strains is resisted. The completed wall is adaptable to even loading. The studs are of equal bearing area, and the webs 11 form coextensive wall faces.

Metal lath, 20, may be suitably secured to the webs 11, and a decorative or finish coat of plaster 20*a* applied. The resulting spaces 21 will accommodate plumbing stand pipes, electrical conduit or other essential accessories (not shown), increasing the utility of the structure.

Having thus described my invention, I claim:

1. A prefabricated masonry structural unit having a rectangular web and flanges at the ends thereof, said flanges being of different depth measured from the face of the web, the proportion of the respective flanges providing for assembling a course of such units in which the longer flanges of contiguous units are in coextensive outer-face to outer-face relationship and the shorter flanges of contiguous units are in coextensive inner-face to inner-face relationship, while maintaining the web faces of alternate units in the same plane.

2. A prefabricated masonry structural unit having a rectilinear web and flanges at the ends thereof, said flanges coextensive with said web at the point of juncture therewith and being of different depth measured from the face of the web, the proportion of the respective flanges providing for assembling a course of such units in which the longer flanges of contiguous units are in coextensive outer-face to outer-face relationship and the shorter flanges of contiguous units are in coextensive inner-face to inner-face relationship, while maintaining the web faces of alternate units in the same plane.

3. A masonry structural unit of substantially U-shaped cross section, said unit comprising a web provided with a flange at each end of the web, said flanges being parallel, one of said flanges being longer than the other by an amount greater than the thickness of the web, the longer flange having a vertical groove in an outer face,

the shorter flange having a vertical groove in an inner face, said flanges being so proportioned that when the said units are arranged to form a masonry course and the longer flanges of contiguous units are in coextensive outer-face to outer-face relationship and shorter flanges of contiguous units are in coextensive inner-face to inner-face relationship, the web faces of alternate units are in substantially a common plane.

4. A masonry structural unit of substantially U-shaped cross section, said unit comprising a web provided with a flange at each end of the web, said flanges being parallel, one of said flanges being longer than the other by an amount greater than the thickness of the web, the longer flange having a centrally disposed vertical groove in an outer face, the shorter flange having a centrally disposed vertical groove in an inner face, said flanges being so proportioned that when the said units are arranged to form a masonry course and the longer flanges of contiguous units are in coextensive outer-face to outer-face relationship and shorter flanges of contiguous units are in coextensive inner-face to inner-face relationship, the web faces of alternate units are in substantially a common plane.

HERBERT ALFRED FABER.