

Jan. 2, 1940.

K. M. GROETSCHER ET AL

2,185,916

WALL STRUCTURAL UNIT

Filed May 25, 1937

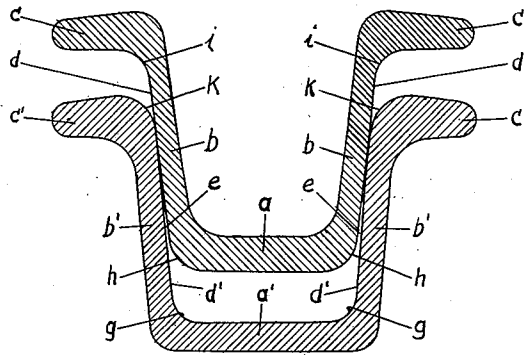


Fig. 1

Fig. 4.

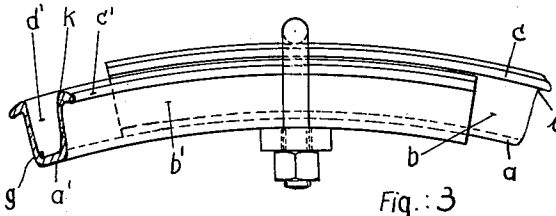


Fig. 3

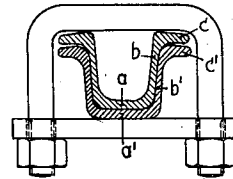
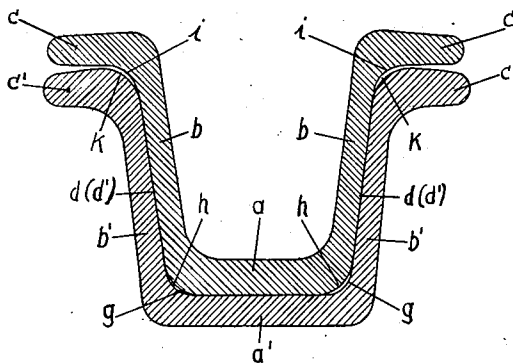


Fig. 2



K. M. Groetschel
H. Toussaint
INVENTOR

By: Glascock Downing & Scholtz
ATTORNEYS

UNITED STATES PATENT OFFICE

2,185,916

WALL STRUCTURAL UNIT

Karl Maria Groetschel, Bochum, and Heinrich
Toussaint, Berlin-Lankwitz, Germany

Application May 25, 1937, Serial No. 144,732

2 Claims. (Cl. 189-36)

The invention relates to an improvement in wall structural units and the object thereof is to provide metal profiles of general channel shape secured together or which may be secured together in overlapping relation at the joints in such manner as to avoid objectionable stresses on parts of the structure which have detracted from the efficiency of such structures in the past. Particularly in known structures the base flange of the outer or overlapping member has been stressed beyond its limit of elasticity in forming the joint and permanently damaged thereby. Another object is to so form the structural elements that three surfaces of the one will be in intimate contact with three surfaces of the other whereby resistance to movement is increased.

Other objects and advantages of the invention will be apparent from the detailed description. These structural units are used in mine walling, for example, and other instances where great strength and durability are required.

Iron profiles similar to channel irons are known, the ends of which overlap at the joints by uniformly interposing the channels under relative pressure. These fit into each other with outwardly inclined side flanges. A clearance is provided between the base flanges of the profiles whereby the channels are adapted to be pressed into each other under wedge action. Securing clips or loops with screw bolts serve as securing means. A compressible insert of wood is usually inserted in the clearance between the base flanges in order to produce pressure within the overlapping on three surfaces.

A too deep pressing of the profiles into each other will be detrimental to the action of the joints of this character. This occurs if the insert is too thin or if an insert is not used at all. When the profiles are gradually pressed into each other, the pressure decreases between the initially inclined contact surfaces of the profile webs and increases between the outer edges of the base flange of the inner profile and the lower contact lines of the inside of the outer profile. Since the base flange of the inner profile is practically rigid, an excessive pressure may have the result that webs and base flange of the outer profile are excessively stressed and consequently forced apart while being constantly shaped. If this structure is adapted to yield and the profiles move together in the direction of the longitudinal axis, the contact edges will be subjected to wear and tear which is detrimental to the sliding of the profiles and the entire wall-

ing will be exposed to the danger of a premature shaping.

The present invention is an improvement on the form of profile described, but avoids its imperfections in that the webs of the pair of profiles do not receive the same but a varying inclination. According to the present invention, such inclinations of the webs are selected that when interposing the profiles of the generally channel shape one within the other, a narrow gap is formed between the contacting pairs of webs, which is open toward the interior of the outer profile and closes when the profiles are pressed into each other. The position of the lateral forces becoming effective when the securing screws are tightened is thereby shifted from the immediate vicinity of the web roots to the elastic ends of the webs. The channels may therefore be completely drawn into each other without stressing the profile webs beyond the limit of elasticity and depriving them of their elastic property. The elasticity of the profile webs prevents a constant deformation or rupture of the outer profile within the overlapping of the profiles, ensures a satisfactory binding and allows of the yielding of the frame to be better controlled and regulated.

Furthermore, it is proposed that the paths leading from the relatively contacting web surfaces to the corresponding base flange surfaces be formed in such a manner by a rounding off or beveling that when the channels are completely pressed into each other, a narrow space remains in the corners between the profiles. The same applies to the paths leading from the said web surfaces to the corresponding surfaces of the side flanges provided it is not preferred to make the webs of the inner profile so high that a contact between the side flanges cannot take place. This feature ensures the complete effect of the gap or space provided between the webs and will always prevent, in conjunction with the said gap and in the case of correct dimensions, a detrimental linear pressure between the profiles so that when the profiles are moved together, a detrimental wear and tear cannot take place.

A constructional example of the invention is shown in the accompanying drawing.

Figure 1 shows a cross section through an interposed pair of profiles before the pressing into each other.

Figure 2 shows the same after the channels are completely pressed into each other.

Figure 3 is a side elevational view of a pair of

overlapping profiles with means for holding same together, and

Figure 4 is a cross sectional view of the arrangement shown in Figure 3.

5 With reference to the figures of the drawing, *a* indicates the base flange, *b* the web flanges, and *c* the side flanges of the inner profile. *a'*, *b'* and *c'* indicate the corresponding flanges of the outer profile. Both profiles are preferably dimensioned
10 in cross section in such a manner that with the same weight, they have practically the same static values. According to the invention, the inclination of the outer surface *d* of the webs *b* deviates from the inclination of the inner surface *d'* of the webs *b'* in such a manner that
15 when placing the channels into each other, they do not at first completely fit into each other but, as shown in Figure 1, leave a gap or space *e* between the webs *b* and *b'* which is open toward
20 the base flange *a'*. When pressing the channels into each other by tightening the screws of the securing clips *m*, the inner profile moves into the clearance between the base flanges and the gaps or spaces *e* are closed, the webs of the outer
25 profile being elastically pressed outwardly and under certain circumstances the webs of the inner profile being elastically pressed inwardly. The spaces *e* are preferably so dimensioned by a corresponding inclination of the web surfaces
30 that they are only completely closed when the base flanges of the profiles are in relative contact, as shown in Figure 2. A complete three-surface contact can thereby be obtained within the overlapping of the profiles without inserting
35 a compressible member between the base flanges and the outer profile will embrace the inner profile in a satisfactory manner. The elastic binding force of the profile webs holds the channels firmly within each other and substantially relieves the connecting screws.
40

It is also obvious from Figure 2 that after closing the spaces *e*, gaps remain in the corners of the profiles according to the invention. These gaps are provided because the inner angles be-

tween the base flange *a'* and the webs *b'* of the outer profile receive curvatures *g* having a smaller radius than the curvatures *h* of the outer angles of the base flange *a* and the webs *b* of the inner profile. In accordance with the side
5 flanges, the radius of the curvatures *i* between the webs *b* and the flanges *c* is smaller than the radius of the curvatures *k* between the webs *b'* and the side flanges *c'*. Linear contacts under rigid pressure are thereby avoided.

The invention is not limited to mine walling but can also be advantageously used in all other structures wherein the same or similar conditions prevail.

Having thus described the invention what is claimed is:

1. A structural unit comprising a pair of profile members of channel shape configuration in cross section each including a base part, web parts and side flange parts the ends of which are adapted
20 to be engaged in overlapping engagement, means for releasably clamping said members together to prevent separative movement of the base parts while permitting of longitudinal sliding movement without rupture, the web parts of each
25 profile member being inclined outwardly relatively to the base part thereof and the web parts of one member being inclined differently to the web parts of the other member so that when the members are interengaged and the base parts are
30 in contacting engagement with each other narrow wedge-shaped spaces are provided between the web parts which open toward the side flange parts and decrease in area as the pressure of the clamping means is increased.

2. A structural unit as claimed in claim 1, in which the paths leading from the contacting surfaces of the web parts to the corresponding base parts and side flange parts are differently rounded off in such a manner that gaps remain
40 in the corners between the profile members when the latter are clamped together.

KARL MARIA GROETSCHEL.
HEINRICH TOUSSAINT.