Dec. 7, 1937. G. F. KOTRBATY 2,101,074

BUILDING SYSTEM AND CONSTRUCTION UNITS AND ELEMENTS THEREFOR

Filed April 22, 1935

Fig. 1.

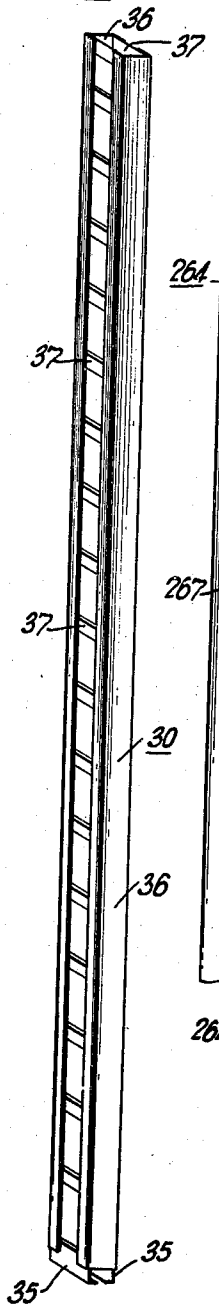


Fig. 2.

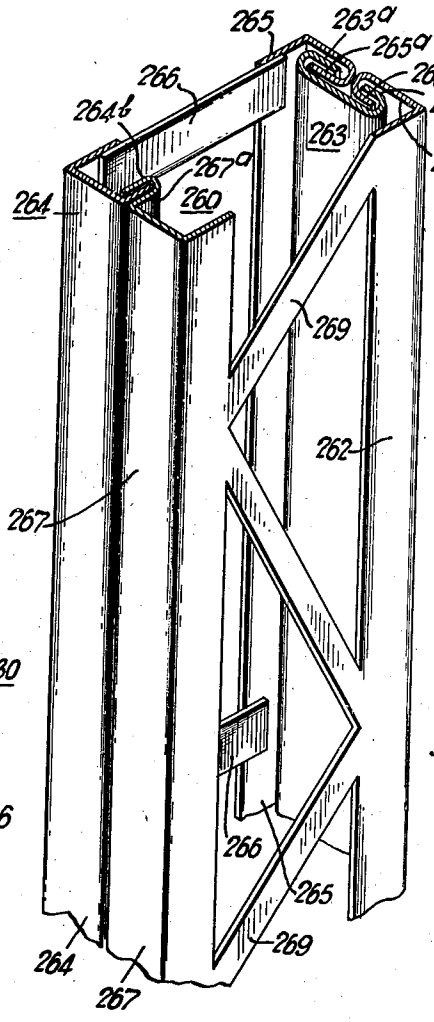


Fig. 5.

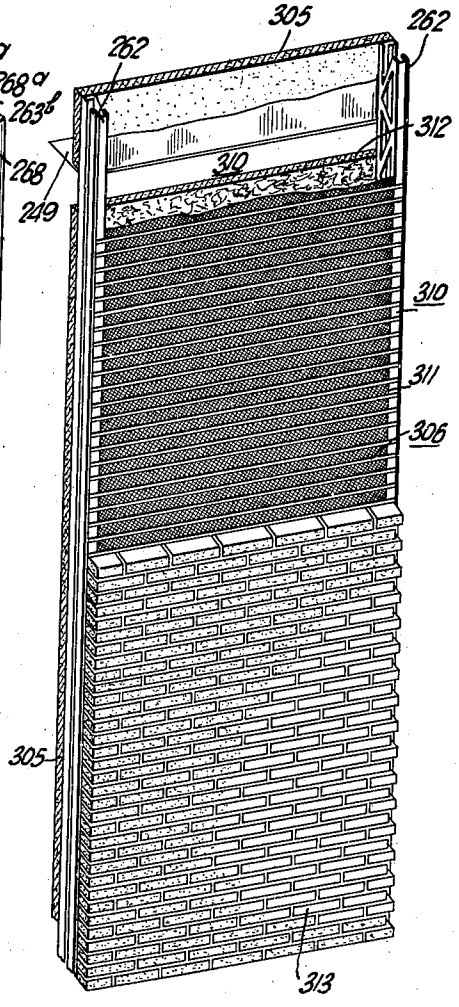


Fig. 3.

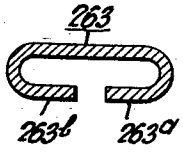
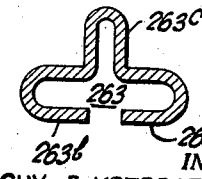


Fig. 4.



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BUILDING SYSTEM AND CONSTRUCTION UNITS AND ELEMENTS THEREFOR

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Application April 22, 1935, Serial No. 17,591

18 Claims. (Cl. 72—1)

This invention relates to improvements in building construction systems and elements therefor, and more particularly to improved wall structures and elements therefor. This application is a continuation in part of my application Ser. No. 758,345, filed December 20, 1934, for Structural building elements and buildings made therefrom.

In my prior Patents 1,877,898 of September 20, 1932, Building construction, and 1,968,045 of July 31, 1934, Building construction, together with their divisional patents and applications, there have been described building constructions in which self-supporting grid units having spaced panel members were secured to and locked by composite stud members having keyways formed therein, and provided further with keys for locking abutted stud members together. Stress has been laid on the provision of an improved monolithic wall and floor joint construction enabling the building and formation of completely monolithically bonded steel houses. Such constructions are structurally efficient and give excellent results. It has now been found, that under certain conditions, mechanical bonds with or without partial monolithic bonding, may, at times be employed to better advantage than a complete monolithic bond in association with the self-supporting structural steel wall and floor members. In certain building constructions it is desired to use continuous wall members and the like, to permit the introduction of service pipes and conduits of various types.

The improvements of the present invention relate more in detail to generally prefabricated unitary and composite wall members and wall units and to improvements in methods and means for assembling the same into completed structures.

The present invention includes as additional features of novelty improved wall joint locking and/or decorative members and associated wall panel features. In addition, the novel improvements of the present invention include provisions for the utilization of skeletal or partly-skeletal structural features in prefabricated elements and structures including preformed materials and panels thereof, and the erection and assembly of the same into completed units and structures with or without associating suitable hardenable structural plastic materials therewith.

It is a feature of the present invention to provide a building construction system formed of self-supporting units mutually abutted and interlocked by novel structural locking members.

It is another feature of this invention to provide improved structural elements, including stud members adapted to receive structural locking and keying members and form composite supporting members therewith.

It is also a feature of novelty of the present invention to provide preformed, self-supporting wall sections having substantially completely finished surfacings and adapted to be mutually associated in completed walls by a variety of integral and composite locking and/or keying means.

Other features of novelty include preformed, self-supporting wall members provided with a variety of internal heat and moisture insulating means, and including hardened reinforced structural plastic segments as separate elements adapted to be assembled into a structural entity either at the place of manufacture or erection or wholly or in part at both places.

Special features of novelty also include novel keying and locking means with wall structural features with or without integral or separate furbishing and ornamental and protective elements for wall panel or element joints.

Particular features of novelty include the preparation and utilization of preformed, self-supporting wall panel sections of room height or building height mutually associated in complete wall structures with vertical supporting and locking members incorporated therein or adapted to be structurally associated therewith.

It is also a feature of novelty of the present invention to provide improved studding and beam elements adapted to be mutually interlocked or keyed together, and so constituted and arranged as to permit the free passage therethrough of service pipes and conduits of various kinds.

Other features of novelty of the present invention include self-supporting building construction units adapted to be associated with other like units and separate members to form composite building supporting members provided with panel-receiving means for securing panelling or surfacings to the walls thereof.

It is also a feature of novelty and advantage of the present invention to provide a steel building with the several parts mechanically interlocked and adapted to receive plastic surfacings.

These and other desirable features will be described in the accompanying specification and illustrated in the drawing, certain preferred forms being shown by way of illustration only, for, since the underlying features may be incorporated in other specific structural assemblies, it is not intended to be limited to the ones here

shown except as such limitations are clearly imposed by the appended claims.

In the drawing like numerals refer to similar parts throughout the several views, of which

Fig. 1 is an elevation of a latticed stud including floor connection members;

Fig. 2 is a partial elevation of a modified composite stud assembly having apertured web or side sections adapted for lateral sliding engagement and interfitting and provided with separate keying means;

Figs. 3 and 4 are horizontal sections of keying members adapted for use with the stud construction of Fig. 2, and

Fig. 5 is an elevation, partly in broken section, of structural wall units showing means for securing a variety of surfacings to the panel.

Referring to the drawing, there is shown in Fig. 1 a structurally efficient studding **30** including opposed edge channels **36** spaced apart and secured by interposed lattice members **37**. This studding member is designed to receive wall panel members or wall units and support same on the members **37**, or wall members and/or units may be secured to the studding elements **36** in any desired manner, as by welding, or by mechanical means. The apertures formed between the cross bars or lattice elements **37**, provide apertures therebetween, which not only lighten the weight of the studs without detracting from their structural efficiency, but also permit the passage of horizontal building services, pipes, wiring, conduits, etc., therethrough. The sides or studding elements **36** may be provided with integral or attached feet **35** disposed therebetween which serve to attach and secure the studding to suitable base supports.

Referring now to Fig. 2, there is shown an improved composite stud member adapted to support structural panels in spaced relations and form structural building units therewith. The construction shown in Fig. 2 is designated generally by the numeral **260**. This composite construction, as will be noted more in detail therewith, provides continuous latticed or substantially open ended stud constructions permitting the passage and introduction of building servicings, such as pipes, conduits, etc.

Referring now more specifically to the improved composite structure shown in Fig. 2, a pair of opposed, generally channel shape members **261** and **262** are shown, abutted and interlocked and keyed by a key member **263**. The channel section **261** comprises a pair of spaced angles **264**, **265** spaced apart and secured to and by the lattice members **266**. These members may be spaced apart in any suitable arrangement to provide apertures therethrough. The section or angle **264** has an exterior flange provided with a separate flange **264*a*** to form a channel shaped member, both of the flanges being inturned. The member **265** has its end flange section bent over to form an abutting and depending gripping and locking flange **265*a*** adapted to engage the keying member **263**, and more particularly the key flange **263*a*** thereof. Member **263** is provided with a pair of key flanges **263*a*** and **263*b*** formed generally parallel with the bottom portion or body of the member and turned inwardly thereof.

The composite stud section member **262** comprises end channels **267** and **268** with an intermediate expanded section having diagonal lattices or members **269** integral with the end sections. The sections **269** may be formed by slotting the body or bottom portion of the generally channel shaped member **262** by stretching or expanding the same to pull the cross pieces or diagonals **269** apart. The flange **267** of stud section **262** is provided with a gripping flange section **267*a*** adapted to overlie and receive the locking flange **264*a*** of section **261**. The stud flange section **268** in its turn is provided with an overlying beaded edge and flange section **268*a*** corresponding generally to the section **265*a*** of the opposed abutted member. Key section **263** is adapted to be slid over in mutual locking engagement with the flange sections **265*a*** and **268*a***, locking them in place after member **261** and associated structural parts have been slid into laterally abutting and locking engagement with section **262** by having flange **264*a*** slide in fitting engagement into gripping and securing section **267*a***. With this construction it will be noted that a mere sliding, lateral pushing engagement permits the accurate alignment of stud sections **261** and **262** and their associated building parts and this alignment may be accurately and permanently secured by providing an extra locking member **263** fitted in place over the locking members of the stud sections. It will be noted that the key member **263** may be provided with a central stiffening bead **263*c*** in the body portion thereof to provide extra stiffening and structural strength to the combination.

Referring now to Fig. 5, a self-supporting building wall member will now be described. For purpose of convenience these separate panel sections will be individually identified to permit reference thereto.

Referring now to Fig. 5, a panel construction **310** is shown. In this construction there is shown, by way of example, end structural stud sections **262** including opposed flanged edges **267**, **268** spaced apart and held by expanded lattice members **269**. These members **310** may have panel surfacings **311** of any suitable material applied thereover, including foraminous metal lath or the like. An insulating filling **312** may be used to fill the inter-panelling space. Structural surfacings **305** may be applied to one or both surfaces and may include hardenable cementitious plastics or structural sheet materials. Where panelling members or tilings are to be applied over the surfacings as exterior structural finishes, securing members designated generally by the numeral **306** may be secured between the stud sections **262** and tilings or fabric bricks **313**, or other members slid in interlocking engagement therewith. The joints of these members may be filled with suitable waterproof grouting or binding material, including plastic rubber base compositions, mortar, putties and other suitable materials. Where desired, flashings **249** of suitable size and wall surfacings **305** may be applied in the usual manner.

It will be now appreciated that there have been provided improved structural building systems including preformed and prefabricated wall and floor units and panels either as unitary constructions or as composite multipartite constructions, said panels and building units being adapted to be secured to improved building supporting members and to engage same in mutual interlocking relationship. In addition, the improvements of the present invention have been disclosed with structural skeleton supporting members and units adapted to be used as carcasses for a variety of preformed building units and sections, as well as to permit the fabrica-

tion and erection of aligned wall and corner wall constructions and to permit the elaboration of the structural carcass sections into complete building skeletons over which structural cementitious coating and panelling, either cast or applied in preformed and prefabricated condition in situ, or structural elements and composite parts may be secured.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the forms and assemblies illustrated and in their mutual cooperation may be made by those skilled in the art or without departing from the spirit of the invention.

I claim:

1. A structural composite stud member comprising a two-part abutted and latticed channel construction, one side edge of each channel having unilateral mating sections including a channeled angular flange on one section and a straight, angular flange on the other sections fitting the channeled flange in a sliding fit, and movable laterally into operative position therein, bent-over key-receiving flanges on the other edges of the channels, and bi-laterally channeled keying means fitting over and engaging the said keying flanges in longitudinal sliding keying engagement.

2. A composite structural stud member comprising a two-part construction including generally channel-shaped members having apertured base sections forming latticed construction, flanges forming the sides of the separate channel members, said flanges being adapted to receive panel sections of self-supporting building units, the said sections being adapted to be abutted and mutually interlocked to form composite structural stud members, the said several sections including unilateral tongued and grooved mating parts adapted for mutual sliding engagement, opposed return flanges on the other side of the sections, and unitary keying means fitting in and over the return flanges.

3. A structural composite stud member comprising a pair of generally channel-shaped sheet metal members, the said members being abutted to form a hollow columnar section, unilateral tongued and grooved mating sections formed on the sides of the members and interiorly thereof; inturned locking flanges formed on the other sides of the members, and separate bi-laterally channeled and longitudinally slotted keying means adapted to overlie and secure the last said locking flanges.

4. A structural composite stud member comprising a pair of generally channel-shaped sheet metal members, the said members being abutted to form a hollow columnar section, mating sections formed on the sides of the members and interiorly thereof; inturned locking flanges formed on the other sides of the members and separate keying means adapted to overlie and secure the last said locking flanges, the said mating locking sections including an inturned flange on one channel member, and an inturned channeled flange on the other member adapted to receive the first said flange in the said channeled flange.

5. A structural composite stud member comprising a pair of generally channel-shaped sheet metal members, the said members being abutted to form a hollow columnar section, mating sections formed on the sides of the members and interiorly thereof; inturned locking flanges formed on the other sides of the members, and separate keying means adapted to overlie and secure the last said locking flanges, the intermediate or base sections of channel members being apertured to form lattice constructions.

6. A structural composite stud member comprising a pair of generally channel-shaped sheet metal members, the said members being abutted to form a hollow columnar section, mating sections formed on the sides of the members and interiorly thereof; inturned locking flanges formed on the other side of the members, and separate keying means adapted to overlie and secure the last said locking flanges, the intermediate or base sections of channel members being apertured to form lattice constructions, and the lattices being arranged in aligned relationship.

7. A structural composite stud member comprising a pair of generally channel-shaped sheet metal members, the said members being abutted to form a hollow columnar section, mating sections formed on the sides of the members and interiorly thereof; inturned locking flanges formed on the other sides of the members, and separate keying means adapted to overlie and secure the last said locking flanges, the metal of the base of the channel being slotted and expanded to form a lattice construction in the stud member.

8. A structural sheet metal channel for composite latticed stud constructions comprising a generally channel-shaped member having an apertured base section, side sections defining a channel with the base section, one of said side sections having a rectilinear flange on its edge and the other said side section having a reversely bent flange section on its edge parallel to the side and forming a key-receiving channel therewith.

9. A structural sheet metal channel for composite latticed stud constructions comprising a generally channel-shaped member having an apertured base section, side sections defining a channel with the base section, one of said side sections having a rectilinear flange on its edge extended and reversely bent to form a channel section adapted to receive a flange section in mating locking engagement, and the other said side section having a reversely bent flange section on its edge parallel to the side and forming a key-receiving channel therewith.

10. A structural sheet metal channel for composite latticed stud constructions comprising a generally channel-shaped member having a slotted and expanded apertured base section, side sections defining a channel with the base sections, one of said side sections having a rectilinear flange on its edge and the other said side section having a reversely bent flange section on its edge parallel to the side and forming a key-receiving channel therewith.

11. A structural sheet metal channel for composite latticed stud construction, comprising a generally channel-shaped member having a slotted and expanded apertured base section, side sections defining a channel with the base section, one of said side sections having a rectilinear edge flange extended and reversely bent to form a channel section adapted to receive a flange section in mating locking engagement, and the other said side section having a reversely bent edge flange section parallel to the side and forming a key-receiving channel therewith.

12. In a construction of the type described in claim 3, improved keying means comprising a sheet metal member having a base section and inturned edge flanges forming locking channels adapted to receive bent-over channel edges of stud flange sections.

13. In a construction of the type described in claim 3, improved keying means comprising a sheet metal member having a base section and inturned edge flanges forming channels adapted to receive bent-over channel edges of stud flange sections, the said base section having a central longitudinal bead section and stiffening member formed therein.

14. A structural building unit comprising panel sections supported and spaced apart by end sections having means for the mutual interlocking of same with abutted like building unit sections, the said end sections comprising channel shaped structural members having the edges turned outwardly of the unit, one of said channels having an edge formed with a rectilinear flange and the other edge with a bent-over flange, the other said channel member having one edge formed with a rectilinear channeled flange and the other edge of the said second channel having a bent-over flange, the rectilinear flanges forming slip-fit locking members and the bent-over flanges being locked together by common keying means when structural units are abutted and the rectilinear flanges slid into mating engagement, the said abutted panel-spacing and end-supporting means forming hollow stud sections and being apertured to permit the passing of horizontal pipes and building services therethrough.

15. A building wall construction including a plurality of abutted self-supporting building units, each unit comprising spaced panel members secured to and spaced by apertured end members, the apertured end members forming stud sections and forming composite studs with other like abutted members of building units and locked thereto to form composite studs, the said end sections comprising channel shaped structural members having the edges turned outwardly of the unit, one of said channels having an edge formed with a rectilinear flange and the other edge with a bent-over flange, the other said channel member having one edge formed with a rectilinear channeled flange and the other edge of the said second channel having bent-over flange, the rectilinear flanges forming slip-fit locking members and the bent-over flanges being locked together by common keying means when structural units are abutted and the rectilinear flanges slid into mating engagement, the said composite studs including a hollow columnar section for the installation of both horizontal and vertical pipes and building services therethrough.

16. A building construction system, including self-supporting structural building members having panel wall sections spaced apart and secured by end stud sections, the said end sections comprising channel shaped structural members having the edges turned outwardly of the unit, one of said channels having an edge formed with a rectilinear flange and the other edge with a bent-over flange, the other said channel member having one edge formed with a rectilinear channeled flange and the other edge of the said second channel having bent-over flange, the rectilinear flanges forming slip-fit locking members and the bent-over flanges being locked together by common keying means when structural units are abutted and the rectilinear flanges slid into mating engagement, the said sections being apertured and secured to other like sections of adjacent units whereby to form hollow composite studs; the composite studs having the apertures in alignment for passage of building services horizontally therethrough, and also permitting the passage of building services vertically therein.

17. A building wall construction, including self-supporting building units having internal wall-faces secured to and spaced apart by end stud sections, the said end sections comprising channel shaped structural members having the edges turned outwardly of the unit, one of said channels having an edge formed with a rectilinear flange and the other edge with a bent-over flange, the other said channel member having one edge formed with a rectilinear channeled flange and the other edge of the said second channel having a bent-over flange, the rectilinear flanges forming slip-fit locking members and the bent-over flanges being locked together by common keying means when structural units are abutted and the rectilinear flanges slid into mating engagement; apertures in the stud sections, the so-formed composite studs being keyed together and being adapted to receive both vertical and horizontally disposed building services.

18. A building construction system, including self-supporting structural building members having panel wall sections spaced apart and secured by end stud sections, the said end sections comprising channel shaped structural members having the edges turned outwardly of the unit, one of said channels having an edge formed with a rectilinear flange and the other edge with a bent-over flange, the other said channel member having one edge formed with a rectilinear channeled flange and the other edge of the said second channel having a bent-over flange, the rectilinear flanges forming slip-fit locking members and the bent-over flanges being locked together by common keying means when structural units are abutted and the rectilinear flanges slid into mating engagement; the stud sections being slotted and expanded to form apertures, the sections being secured to other like sections of adjacent units to form hollow composite studs; the hollow composite studs having the apertures in alignment and permitting the passage of building services horizontally therethrough, and also permitting the passage of building services vertically therein.

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