A modular building system including a plurality of upright panels arranged in edge butting relationship with adjacent oriented panels being connected via an interlocking fastener. Each of the individual panels are prefabricated and comprised of first and second spaced, outer skin members having at least one upright rolled over edge for cooperatively receiving the fastener and for engagingly supporting an end partition, the latter having a generally arcuately shaped cross section which defines an upright, concavely extending recess along the transverse side edge of the panel. An insulating core is disposed interiorly of the outer skin and bondingly secures the inner surface of the partition and the outer skin members. After assembly of the prefabricated panels, the recess formed between adjacent panels is also filled with an insulating core material providing a finished wall of substantially monolithic construction.
MODULAR WALL SECTION FOR BUILDINGS

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to generally to building structures, and more particularly to a modular building system including a highly versatile, dimensioned, pre-fabricated wall panel therefor.

In constructing various building perimeter and partition walls of the type having exterior skin sections fabricated of preformed sheet metal or plastic panels joined in edge to edge buttting relationship, it is desirable that each of the panels forming the skin have a uniform width and preferably be formed from a uniform stock to minimize the manufacturing costs per unit panel through mass production techniques. Moreover, standardized panels permit the assembled wall to subsequently lengthened or shortened while modular harmony in the wall appearance is maintained simply by adding or removing a given number of panels. As will be appreciated, if panels of different widths were added, or alternatively, existing panels removed, wall modular harmony would be destroyed. In the subject invention, the preformed interior panels are formed of a dimensional width of a first predetermined magnitude selected in accordance with standard window and door widths, and a pair of modular wall sections assembled therefrom are therefore a fixed increment of the width of the exteriorly located skin panels. An end corner section is also provided having a width dimension also formed as an increment of the outer skin whereby modular harmony is retained between both the modular corner sections and the modular wall sections. Thus, a reduction in building costs is realized by providing a modular wall construction wherein no special processing or tooling is required and wherein standardized panels are utilized throughout.

In constructing building walls of the aforementioned type, various standardized dimensions must be considered. For example, the widths of standard windows and doors bear a definite relationship to their thicknesses. In order to establish modular harmony in the building walls by obviating the need for large numbers of panels of differing widths, the panel widths must be selected so that a whole number of panels coincides with standard window and door widths. Moreover, the walls of present day buildings are generally provided with sound and weather insulation in the space formed between the parallel spaced exterior skin members. Such insulation may take the form of various types of concrete, plastic foams, such as for example, polyurethane, or other suitable substances which are poured or foamed into a spacing between the exterior skin panels. Since it is practical to join an inner skin panel to the outer skin panel at the areas wherein adjacent panels abut, the modular portion between the fasteners or joints remain relatively unsupported. Thus, the panel width must be designed sufficiently small to prevent excessive bulging due to the outwardly imposed stress of the insulation which is a function of a particular insulating material used, and the distance between panel joints, i.e. an exterior panel width. In the subject modular building system, the panel thickness dimensionally also relates numerically as a function of the width of the panel. Therefore, modular harmony is retained by having the thickness of a modular panel as a function of the width thereof.

Furthermore, depending on whether the insulating core is bonded to the skin panels to form a sandwich type construction, or is of the type which does not bond thereto, maximum acceptable panel width may or may not be limited. In sandwich type construction, the vertical roof load is supported along the entire width of each panel, and the panel width dimension may therefore be made relatively large without detracting seriously from the wall supporting strength. On the other hand, constructions where the insulating is not bonded to the skin are such that the vertical roof load can be supported only at the panel joints. Therefore, the width of these panels is limited so as to provide an adequate number of joints to support the vertical roof load. However, it should be noted that manufacturing and material costs, and erecting time, increases as the panel width decreases since the use of smaller panels increases both the required number of panels as well as the number of studs or fasteners which interconnect the panels. In the subject construction, the insulation is bonded to the exterior skin panels whereby to permit the modular perimeter system to adequately support the vertical roof load, and also to provide a construction wherein the number of panels, as well as the number of interconnecting studs is minimized.

It is possible for each different building construction to determine the most desirable panel width to be used. After a consideration of all of the above factors, however, architectural costs for such a specially designed construction are prohibitive. Additionally, the problem is increasingly complicated if it is also desired to subsequently enlarge or reduce the size of such a specially designed and constructed building, such as by adding a room or rooms thereto. Thus, in lengthening or shortening certain of the walls, additional specially designed panels must be added or a whole number of the old panels removed to retain modular harmony. While accomplishment of this may be possible for a given wall of a building, such as one particular building perimeter wall, a similar dimensional change is generally necessitated to at least some of the other perimeter walls, and correspondingly some of the internal partition walls also may require similar lengthening or shortening. In custom designed buildings, it is generally only by chance that the perimeter and partition walls involved are constructed from uniformly dimensioned panels and, in general, modular harmony can be retained only in one of the walls which undergoes dimensional change. In the subject modular building system, modular harmony can normally be retained because each panel is constructed in accordance with a dimension which is a function of a predetermined unit number. Thus, in most instances, lengthening or shortening of either perimeter or partition walls is possible via removal of an end or corner section and the assembly of additional modular sections.

Another problem area arises in insulating to soundproof and weatherproof the walls. One method is to preform and assemble complete insulated walls which are shipped and erected at the building site. Another method is to ship individual uninsulated wall sections to the site and let the builder assemble the sections to form the walls and then foam the insulation on location. In the method first referred to, the walls are necessarily large so that they are awkward to handle and ex-
pensive to ship, particularly if a heavy insulating material such as concrete is used. Also, it requires special jigs and other machinery and the use of a relatively large area in the factory. Moreover, considerable revisions in jig designs and other engineering specifications are necessary to modify the size of the wall assemblies. Inasmuch as sheet metal is not conventionally rolled or extruded in widths greater than 48 inches, maximum panel width is limited accordingly. Then, too, preformed walls may have insulation voids at the joints between the wall sections which result in undesirable heat loss but more importantly, provides access of moisture laden atmospheric air which results in condensation and possible ice formation which is extremely undesirable. In the other method referred to where the entire assembling and insulating process is preformed at the building site, the builder is required to purchase and have on location an apparatus to foam the insulating cores in the walls. This type of machinery is expensive bulky, difficult to move, and it requires an excessive amount of time to insulate the wall particularly under bad or unfavorable weather conditions. Further, this procedure requires the use of expensive equipment and large numbers of highly trained technical people which is undesirable.

The subject modular system has the advantages of both methods referred to above and minimizes the disadvantages of both. Standardized preformed modular wall sections comprising at least one end dam member interposed between spaced inner and outer skin members and a foamed-in-place insulating core are assembled at a factory site. The end dam member is accurately shaped in transverse section and it is placed between the inner and outer skin members with the concave surface thereof facing outwardly and with the opposite marginal edge portions thereof behind and interlocked or interfitted with re-entrant flanges at the edges of the skin members. The modular wall sections can then be assembled in the field by an interlocking stud; and the space between adjacent sections defined by the confronting dams and the intervening space to be foamed between the butted edges of the sections and thus insulates the space from the atmosphere. Since the end dams preferably are of polyvinyl chloride of other non-heat conductive plastic material, they and the embracing arms of foam core at the edges of the wall sections, confine and retain heat generated in the intervening space during field foaming so that the field foaming operation can be carried out under more adverse temperature conditions than would otherwise be possible. In addition, less material is required to completely fill the intervening space and the field foamed core formed in the space is lighter and has the wall particularly by extending heat insulating qualities. Shipping costs are minimized, the amount of apparatus required at the building site is minimized, and fewer numbers of skilled, technical people are required on the job.

Thus, the present invention makes possible a continuous, or generally monolithic insulating core throughout the walls of the building, while minimizing the insulation foaming required at the building site. Additionally, these results are obtainable in virtually any building site and even under extreme temperature conditions. Moreover, because the insulating wall construction is substantially continuous, and for all practical purposes monolithic, undue heat loss or sound transfer through the walls is virtually eliminated. The wall construction is also free from mechanical connectors or fasteners which results in water tight joints, and the system makes use of the foaming characteristics of the insulating materials whereby to make possible a wall construction possessing great strength both as to vertical load bearing qualities as well as resistance to bending under lateral forces.

The end dam construction of the subject invention also solves many of the heretofore construction problems relating to systems employing removable end dam devices. Previously in the assembly of modular sections, a removable dam was utilized which, generally speaking, was part of the foaming fixture and was adapted to be inserted along the edges of a modular section and between the exterior outer skin panels to confine the foam to the interior of the section. As the foam was introduced between the skin panels, the outer surface of the insulating foam cured to form a skin layer adapted to provide a good bonding surface at a joint devised to receive additional insulating foam at assembly at the building site. The problem, however, was that the removable dam had to be covered with a parting agent which in practice was found to bond the dam to the skin layer after a relatively few modular sections had been produced. In such cases, the modular section had to be destroyed to facilitate removal from the foaming fixture. The parting agent also was found to sometimes react chemically with the foam whereby the cell structure of the foam was destroyed. By increasing the frequency of the application of the parting agent to the removable end dam, the bonding action was temporarily alleviated, but eventually even this was not fully expedient and the end dam fixture had to be ground down and polished to facilitate further production. As will be appreciated, production efficiency was reduced. One solution to alleviate the above, was to wrap the removable end dam fixture with paper material or paper material soaked in oil and polyethylene. This required removal of the dam from the supporting fixture, and required removal or stripping away of the material which adhered to the insulating foam. The end result was that more time was required for manufacturing, and again a resultant decrease in efficiency. Moreover, it was not economically feasible to inspect each section to insure that all of the wrapping material was completely removed from the face of the insulating core and the pieces which tore away were often found stuck to the foam. Then, in the field the foam tended to sometimes bulge around the pieces which in some instances projected outwardly, resulting in voids or cavities which adversely affects the heat insulating qualities of the assembled wall structure. Various alternate wrapping materials other than paper which would not tear away were found to be so expensive that the cost was prohibitive and the process therefore economically unfeasible.
Another problem which was found relative to the above, resides in the structure itself being comprised of a pair of spaced outer skin panels having only a foam skin layer along an outer edge. Through handling in the field, the foam edges of the section were exposed to bending resulting in destruction or distortion of the panel edge which was sometimes found difficult to correct without leaving crevices and other surface blemishes. Moreover, the normally upright edge portions of the modular sections provide convenient lifting surfaces in the field which often resulted in tearing or pulling away of the outer skin panel from the insulating core which also presented a serious problem.

The solution of the problems enumerated above have been solved by mounting at the side edges of the modular sections integral end dams of suitable arrangement and configuration and mechanically interlocked with the skin panels of the sections to provide a stronger edge construction and a stiffening closure member which is bonded to the foam core and remains in place relative to the insulating foam and outer skin under all conditions of handling and use. Thus, in instances where the section is picked up by the edge, the end dam provides sufficient strength to remain totally bonded to the insulating foam. The result is a significant increase in efficiency and also a decrease in manufacturing costs. The end dam also very substantially reduces the time required for field foaming. In this regard, it will be noted that because of the greater strength of the modular section due to the end dam member, the foaming agents are permitted to be introduced into the joints faster than heretofore.

In the former practice it was found that if the foam was introduced too rapidly or improperly mixed, the foam created sufficient internal pressure against the marginal edge portions of the panels to tear the latter away from the insulating core. When this occurred, foam introduced between adjacent wall sections in the field penetrated between the panels and the prefoamed cores and produced unsightly and therefore undesirable bulges. Thus, the integral end dam of the subject building system creates a wall structure providing aesthetic modular harmony of a substantially monolithic construction possessing great strength and which is easily assembled in the field. The subject system also provides a highly versatile, uniform building wall panel adapted for use in constructing harmonious partition modular wall sections as well as perimeter sections previously described. The perimeter and partition walls of buildings assembled by the system can be virtually any size or design, with each panel having a width dimension facilitating the installation of standard sized doors and windows. The system takes advantage of the foaming characteristics of certain insulating materials to form a wall construction possessing great strength for supporting roof loads. By the use of the end dams, standard prefabricated modular wall sections are formed in the factory. When the sections are assembled in edge to edge butting relation, a cylindrical recess is formed at the joint between the sections. By also filling these recesses with insulating foam, the installation is substantially continuous.

In view of the above then it is a general object of the subject invention to provide a building system which is easily assembled in virtually any location and under extreme climatic conditions, and which is relatively inexpensive to manufacture, is rugged in construction, and is attractive in appearance.

**BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a fragmentary perspective view of a partial building structure having walls constructed in accordance with the principles of the subject invention;

FIG. 2 is a perspective view of a first and second modular wall section constructed of standardized widths in accordance with the principles of the subject invention;

FIG. 3 is a top view of a skin panel utilized in the construction of the modular wall section illustrated in FIG. 2;

FIG. 4 is a top view similar to FIG. 3 of a substandard skin panel also utilized in the system of the subject invention;

FIG. 5 is a top view of an end dam member utilized in the present system with a retaining fixture therefor illustrated in phantom; and

FIG. 6 is a fragmentary perspective view of a modular corner section also in accordance with the principles of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Generally speaking, the subject modular panel system is comprised of a plurality of exterior panels, each having a rolled over outer edge adapted for assembly with a fastener element as shall hereinafter be described. The metal panels and fasteners are prefabricated or preassembled into modular wall sections which are subsequently filled with suitable foaming material to form extremely rigid, highly insulated, modular sections. By way of example, the sections can be provided in essentially two thicknesses, i.e., one for perimeter wall construction and the other for partition wall construction. Preferably the sections are formed to a standard height, as for instance 20 foot sections, and are subject to be thereafter cut to any suitable height for accommodation to the plan of a particular building unit. Preferably two standard modular wall sections are provided having a width dimension of 32 inches and 48 inches, respectively. In accordance therewith, a standard 16 inch wide panel and a 5½ inch sub-modular panel is provided whereby non-standard modular sections having widths of 26½ inches, 37½ inches, etc., are possible. In this connection, however, it will be readily appreciated that other modular sizes and relationships can be used, are contemplated, and are within the scope of this invention. For example, wall sections 24 inches wide and 4 inches thick can be used as well as multiple and equi-fractional widths thereof. The standard and sub-modular panels greatly increase the design flexibility of the system, and permits almost total freedom in the location of doors, windows, corners, etc. Moreover, standard sized windows and doors are generally available in 16 inch increments therefore providing the system with almost unlimited flexibility.

During the prefabrication operation, the polyurethane foam is held back approximately 3 inches from each vertical edge by means of an end dam which permits field erection of the modular sections by simply sliding down a fastener element thereby interlocking one section to another. The cavity formed between adjacent foamed sections, as defined by a pair of end dams, is thereafter filled in the field with a suitable foaming ma-
rial thus totally, completely, and permanently eliminating all vertical or normally upright recesses utilized for receiving fastener elements. In the field the modular system can be installed on either a slab, the foundation of a crawl space or a full basement, or as an upper story on a previously constructed lower wall by means of a base track adapted for receiving the modular system. After the sections are assembled on the base track, a top plate is located on the upper surface of the assembly and bolted in place with a threaded I-bolt and a steel anchor rod. The resulting structure is thereafter completed via construction of a roof by any conventional means.

With reference now to the drawings, a modular building system, indicated generally at 10 in FIG. 1, is illustrated in accordance with the subject invention. The system 10 is illustrated as being installed on a suitable concrete slab 12 although it will be appreciated that the slab 12 could be the upper section of a full basement structure or a crawl space. A pair of angles 14 and 16 are affixed to the upper surface of the slab 12 via a plurality of suitable fasteners 18, the angles 14 and 16 being suitably spaced in accordance with the thickness of the modular section to receive the lower edge thereof. The outer or exterior surface of each of the angles 14 and 16 can be covered by a suitable trim member panel 20, the latter including a folded over upper section 22 which engages the upper surface of the angle members 14 and 16. The system 10 is sealed relative to the concrete slab 12 via a gasket tape seal 24, the latter being disposed between the angles 14 and 16 whereby to seal the lower surface of the modular system 10 from environmental air leakage or communication thereacross. Alternately, in lieu of the seal 24, a suitable caulking material may be substituted therefor.

After the perimeter wall section of the building system 10 is uprightly assembled, a top plate 26 is located on the upper surface of the system 10 via an anchor rod assembly 28. The assembly 28 is composed of a lower hook shaped member 30 having a lower end fixedly located in the slab 12 and an upper end "rolled over" or hooked for receiving an anchor rod 32. The rod 32 is also hooked at opposite ends for interlocking the member 30 to the plate 26 via an eye bolt 34. An upper threaded end of the eye bolt is located in a suitable aperture formed in the plate 26 and immovably affixed thereto by a suitable washer 36 and threaded nut 38. The assembly of the plate 26 also can include first and second trim members 40 and 42 located on opposite lateral sides of the plate 26. The members 40 include an inner flange member 44 interposed between the lower surface of the plate 26 and the upper surface of the system 10. As is conventional in the art, the top plate 26 is utilized for connecting the roof superstructure to the system 10, as by any suitable means known in the art.

Turning now to the details of the modular building system 10, reference is had to FIG. 1 which shows a modular corner section 46 connected to right angularly disposed modular wall panels 48, the details of which shall be hereinafter described in greater detail. Each of the sections 46 and 48 include an insulating core 50 (such as polyurethane foam) and bonded to inner and outer skin members 52 and 54, respectively. The two skin members 52 and 54 comprise preformed ends, one of which is illustrated at 56 in FIG. 3. Preferably, the skin members 56 are formed from a suitable metal such as aluminum sheet; and the longitudinal or side edges thereof are formed with rolled-over rear flanges 58 which are adapted to be interlocked with suitable connecting studs or fasteners to form the prefabricated corner section 46 or wall panel 48, as illustrated in FIG. 1. The studs, as hereinafter more fully described, also function to interlock adjacent modular sections or panels together to form partitions and perimeter walls. The skin members 56 may vary in width. The one shown in FIG. 3 is a standard size having a width dimension of 16 inches; it is provided with a pair of longitudinal grooves 60 spaced 5½ inches from the side edges of the skin member and from each other to provide aesthetic modular harmony and to increase the bending and compressive strength of the member.

FIG. 4 shows a sub-modular skin member 62 having a width dimension of 5½ inches and rolled-over edge flanges 64 which are shaped identically to the edge flanges 58 of the standard width skin member 56. As indicated previously, the sub-modular skin member 62 increases the fabrication flexibility of the system 10 by permitting incremental increases of a third of a standard 16 inch panel so that, at assembly of a complete wall on a building site, the wall can be put together using any desired combination of 16 inch or ½ inch wall panels. Moreover, the sub-modular skin member 62 may be used to form an end corner section, as hereinafter more fully described.

An end dam embodying the present invention is indicated generally at 66 in FIG. 5. The dam 66 is generally arculate in cross section; and it preferably is formed from a plastic material such as polyvinyl chloride (PVC) which provides good insulating properties and inhibits transfer of heat between the skin members 56 or 62 at the inner and outer sides of the wall 48. The rear surface of the dam 66 preferably is formed with a plurality of laterally spaced, longitudinal grooves 78 which increase the rear surface area thereof and improve the bonding between the dam and the insulating foam material of the core. Also, the dam 66 is provided with one or more radially outwardly extending ribs or vanes 80 which penetrate the foam core and bond to it to assist further in securely uniting the dam and the core. The opposite marginal edge portions of the dam 66 are outwardly tapered, as indicated at 82, to facilitate insertion thereof behind the rolled-over flanges 58 or 64 of the skin members 56 and 62, respectively. A pair of radially inwardly extending, laterally spaced parallel fins or ribs 70 and 72 are provided at each side of the dam 66 behind the tapered marginal edge portions 68, and these ribs are adapted to interfit with holding members on the assembly and foaming fixture, in a manner hereinafter to be described, to position and hold the tapered edge portions 68 behind the rolled-over flanges 58 or 64. The fixture includes end members 76, one of which is shown in FIG. 5, which extend along the longitudinal edges of the wall panel 48 when it is assembled in the fixture preparatory to foaming the core 50; and each end member 76 carries a pair of spaced Z-bars 74 having outer flanges 75 which fit between the fins 70 and 72 in the manner and for the purpose hereinafter described.

Each fixture end member 76 is drivingly associated with a suitable air cylinder (not shown) which is adapted to provide approximately half an inch of travel in the direction of the arrow 77. Thus, the wall panel may be formed by simply assembling the skin members
56 and the end dams 66 in the fixture assembly together with suitable intermediate fasteners or studs and thereafter withdrawing or separating the fixture end members 76, as viewed in FIG. 5, to seat the tapered edges 68 fully behind the rolled-over flanges 58 or 64 of the skin panels 56 or 62, respectively. In this position, the insulating core 50 is added to form the prefabricated modular wall section.

The end dam 66 of the modular system 10 provides numerous advantages relative to prior systems. Note that the problems associated with wrapping materials and parting agents previously utilized to remove the wall panel from the foaming fixture are completely avoided. Moreover, the end dam 66 provides a much stronger marginal edge construction whereby the edge may be utilized for lifting the panel without impairing the bonded connection between the skin members 56 and 62, end dam 66, and insulating core 50. By virtue of the plurality of grooves 78, the vanes 80, nd the enlarged inner surface due to the arcuate cross section, the end dam 66 is securely bonded to the insulating foam introduced in the factory as well as the foam introduced in the field at the building site to fill the space between adjacent end dams. In this regard it will be noted that the end dam 66 also substantially reduces the time for field foaming. Because of the stronger construction of the subject system, the foaming agents may be introduced more rapidly. In the prior systems if the foam was introduced too rapidly or if it were improperly mixed, sufficient pressure was applied against the edges of the panel to tear the skin away from the insulating foam. Thus, it will be appreciated that the end dam 66 provides improved manufacturing and field assembly techniques as well as increased production efficiency.

Reference is now had to FIG. 2 which shows two wall sections indicated generally at 49 and 51. The wall section 49 is composed of two pairs of skin members 56 disposed in edgewise butting relation at the inner and outer sides thereof providing standard width wall sections of 32 inches. Correspondingly, the wall section 51 is composed of three standard skin members 56 arranged in edgewise butting relation at the inner side of the section and three standard skin members 56 similarly arranged at the outer side thereof and collectively providing a width dimension of 48 inches. Each of the wall sections 49 and 51 include end dam members 66 located at the opposite longitudinal side edges thereof and one or more studs 82. Each of the studs 82 comprises drive cleats 83 having generally C-shaped outer portions which secure the rolled-over flanges 58 or 64 of adjacent skin members 56 and 62, respectively, by slidable insertion thereacross and an intermediate insulating tubular member 85 which interconnects with the inner edges of the drive cleats and provides a heat barrier which prevents or inhibits transfer of heat between the inner end skin members 56. The particular form of stud 82 forms no part of the subject invention and is indicated in the drawings for illustrative or exemplary purposes. Reference may be had, however, to the copending application of Sven A. Carlsson, Ser. No. 289,761, Filed Sept. 15, 1972, entitled “Sectional Stud for Modular Wall Section,” for a complete disclosure of a preferred fastener, the copending application being incorporated herein by reference.

With reference to FIG. 6, a corner section is indicated generally at 46. The section 46 is formed from a plurality of the sub-modular panels 62 and includes a pair of the sub-modular panels 62' folded longitudinally at the middle thereof to form corner panel 62'. It will be noted that the inner width dimension of the corner section 46 measured from the corner to an upright edge is comprised of one and one half modular panels 62 to provide a width dimension of 8 inches, the 8 inches also being in accordance with the modular harmony previously described. The panels 62 and 62' are assembled in a manner similar to the standard panels 49 and 51 and are connected by the studs 82. The opposite up-right edges of the corner section 46 also includes end dam members 66. The outer spaced, folded submodular panel 62' is connected on opposite sides to each of the submodules 62 via a stud 82'. The stud 82' is identical to the stud 82 but utilizes connecting recesses disposed 90° apart on the insulating tubular member 85 rather than recesses which are 180° apart as in the case of the studs 82 previously described and illustrated in FIG. 2. Again reference may be had to the copending application previously incorporated herein by reference for a disclosure and the precise details of the stud 82'.

In regard to the assembly of the modular system 10, the skin members 56 or 62, the end dams 66, and the studs 82 or 82' are preferably preformed in 20 ft. segments and factory assembled. Prior to the introduction of the insulating foam, the preassembled section 49, 51, or 46 is positioned upright in a suitable fixture adapted to support the outer lateral surfaces of each of the outer panel members 56 or 62. By supporting the exteriorly located panels 56 or 62, the tendency for bulging due to foam pressure is obviated. The foam is then introduced and permitted to cure. After curing, the prefabricated modular section may be cut to suit the height of the structure wherein the section is to be utilized. The prefabricated sections are then shipped to the building site where they are interconnected by studs 82 or assembled to form a complete wall, such as the fragmentary structure illustrated in FIG. 1. After assembly, the recess formed between the adjacent end dams 66 is filled with an insulating foam thereby providing a perimeter or partition wall structure of substantially monolithic construction.

In regard to the materials utilized in the modular building system 10, the skin members 62 and 56 desirably are formed from sheet metal and preferably from sheet aluminum. The end dams 66 and the tubular members 85 of the studs 82 preferably are formed from a suitable insulating plastic material such as PVC. The foam itself is preferably polyurethane foam which bonds well with the skin members and end dams. It will be noted that the thickness of each of the sections 49, 51, or 46 is also preferably formed as an increment of the 16 inch standard panel 56 and is preferably 5½ inches across whereby to also facilitate subsequent lengthening or shortening either a perimeter or partition wall shall the need arise. With respect to the partition wall construction, it is preferred that the partition wall thickness be half of that of the perimeter walls to also provide modular harmony and maximize the interior usable building space. In regard to aesthetic harmony of the modular building system 10, various exterior finishes may also be utilized on the exterior of the skin members 56 or 62 to customly blend with the inside and outside decor of the final structure.
While it will be apparent that the preferred embodiments of the modular system illustrated herein are well calculated to fulfill the objects above stated, it will be appreciated that the present invention is susceptible to modification, variation, and change without departing from the scope of the invention.

I claim:

1. A preformed structural wall including at least two modular sections disposed in edgewise butting relationship, each section having,
a foamed-in-place insulating core, inner and outer skin panels bonded to the core and having portions thereof projecting laterally beyond said core and formed with opposed inwardly rolled re-entrant locking flanges, and
a generally semi-cylindrical end dam of heat insulating material disposed between and interconnecting the projecting portions of said panels with the marginal edge portions of the dam extending behind and mechanically interlocked with the re-entrant flanges of said panels,
said insulating core including portions adjacent to said end dam which extend into the areas defined by the sides of the end dam and the portions of the skin panels extending from said re-entrant locking flanges, said portions of said insulating core embracing said end dam and forming insulating protective shields for the space behind said re-entrant flanges and surrounded by said end dam to permit effective field foaming of said space under adverse conditions of ambient temperature when said wall section is joined in edgewise butting relation to a similar adjacent wall section,
said end dam seating against and bonded to said core and defining a concave facing at the edge of said wall section, said end dam of one of said sections confronting the end dam of the other and defining a generally cylindrical space,
means in the generally cylindrical space defined by said end dams interfitting with said re-entrant flanges and interconnecting said wall sections to hold the latter securely together,
the protective shield portions of the insulating cores of said wall sections completely surrounding said cylindrical space except for the extreme edges of the butted skin panels and the joints therebetween and insulating the same from the outside ambient air to improve the conditions in said space for field foaming, whereby pressure exerted against said dam by the foam material when said core is formed forces the interlocking edges of the dam firmly against the rolled flanges of the panels to hold the marginal edge portions of the latter against bulging during the foaming operation and from being separated from the foam core by handling of the finished wall section.

2. A modular wall section for forming a wall of a building structure or the like comprising:
a pair of parallel spaced skin panels provided at corresponding edge portions thereof with opposed re-entrant flanges disposed generally parallel to and spaced from the inner sides of their respective panels;
an end dam disposed between and transversely of said panels having opposite marginal edge portions extending behind and underlapping said re-entrant flanges, said marginal edge portions and said re-entrant flanges being substantially continuously spaced apart and defining a substantially continuous, inwardly opening way therebetween; and
a foamed synthetic resinous core between said panels and bonded thereto,
the marginal edge portions of said end dam engaging substantially continuously outwardly against said skin panels whereby to confine said core during manufacture of said wall section, and
the marginal edge portions of said end dam being engageable by the re-entrant flanges of said panels during handling of said wall section to limit outward flexure of the edge portions of the panels and consequential delamination of said panels from said core.

3. The wall section as set forth in claim 2 wherein said end dam is formed to provide a concave facing at the edge of said wall section.

4. The wall section as set forth in claim 2 including means adapted to be accepted by said ways in interfitting relation with said reentrant flanges for interconnecting said wall section to a similar wall section disposed adjacent thereto.

5. The wall section as set forth in claim 3 including a second similar wall section disposed adjacent thereto, said wall sections being arranged in edgewise butting relation with the concave facings thereof opposite each other and defining an elongate lined passage between said sections.

6. The combination as set forth in claim 5 including cleat means having portions thereof slidable acceptable in the open ways of said wall sections and interfitting with the re-entrant flanges thereof for interconnecting said wall sections.

7. The combination as set forth in claim 5 including stud means in said passage, said stud means having clear portions slidable accepted in the open ways of said wall sections and interfiting with the re-entrant flanges thereof, said stud means interconnecting said wall sections and holding the edge portions of the skin panels at opposite sides of said wall sections spaced rigidly apart and the butted edges of said skin panels flush with each other.

8. The wall section as set forth in claim 2 wherein said end dam is semi-cylindrical in cross section and is positioned between said skin panels with the inner surface thereof facing outwardly and defining a concave facing at the edge of said wall section, the concavity of said facing providing a convenient hand hold for handling of said panel and defining a lined cavity for accommodating connectors and utilities when said section is assembled in a wall.

9. The wall section as set forth in claim 8 wherein the underlapping portions of said end dam are relatively thinner than the main body of said end dam, whereby the portions of said marginal edges that penetrate the space behind said re-entrant flanges are essentially thin and flexible to permit said marginal edge portions to conform intimately more readily to the inner surface of said skin panels so as to prevent penetration of said core into said way.

10. The wall section as set forth in claim 8 wherein the marginal edge portions of said end dam are tapered toward the edges thereof.

11. The wall section as set forth in claim 8 wherein portions of the dam adjacent to said marginal edge portions are disposed in outwardly divergent relation.
12. The wall section as set forth in claim 11 wherein the interengaging portions of said end dam and said skin panels define wedge shaped areas into which said core extends to form insulating protective shield portions disposed in generally embracing relation to said end dam.

13. The wall section as set forth in claim 12 wherein said core is a relatively hard rigid cellular structure whereby the protective shield portions of said core strengthen and re-enforce said end dam during handling of said wall section.

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