United States Patent

[11] **3,549,115**

[72] Inventor **Frank L. Williams**
Newtown Square, Pa.

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[73] Assignee **American Cement Corporation**
Los Angeles, Calif.
a corporation of Delaware

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[54] **FORM FOR MONOLITHIC CONCRETE WALL CONSTRUCTION**
12 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **249/33,** 52/235, 52/598, 52/604, 249/97, 249/192
[51] **Int. Cl.** **E04g 11/06**
[50] **Field of Search** 249/192, 191, 190, 189, 193, 35, 47, 45, 140, 55; 25/131M, 118M, 1C, 44

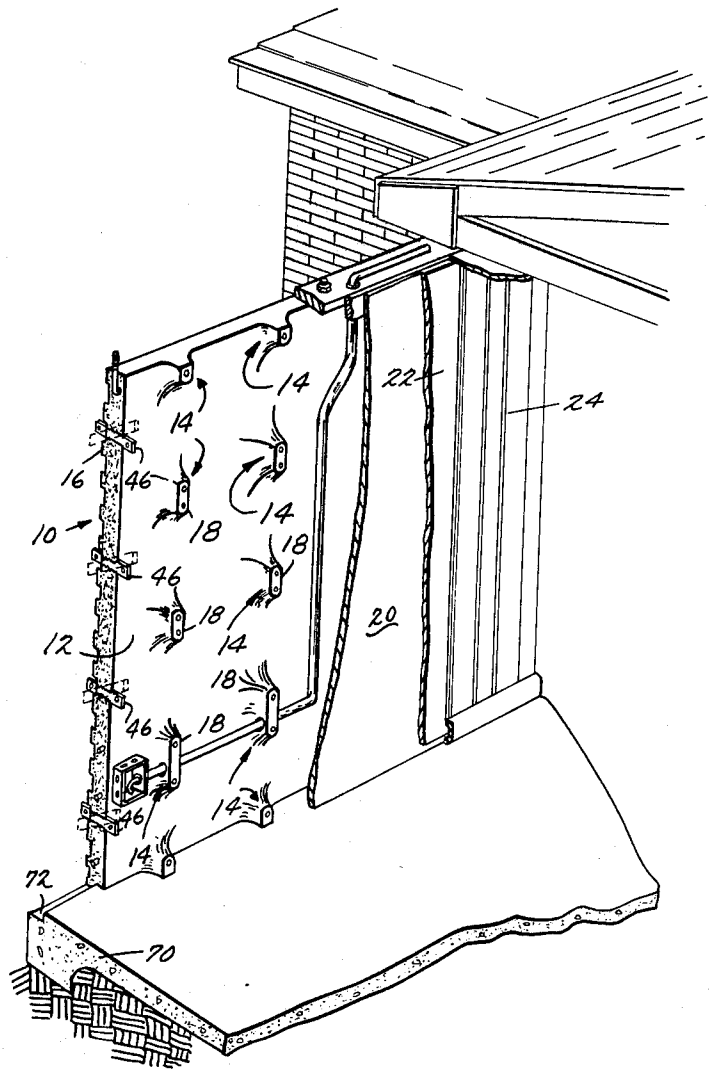
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Primary Examiner—J. Spencer Overholser
Assistant Examiner—Michael O. Sutton
Attorney—Cushman, Darby & Cushman

ABSTRACT: A lightweight form is provided for producing an improved surface configuration for a cast monolithic concrete wall construction. The wall is produced to include a plurality of integrally formed, spaced, pad members which project outwardly from a surface of the wall to provide places of attachment for sheet material which is fastened onto the pads in a spaced relationship from the monolithic wall. An aluminum, or other lightweight material, form is provided with specially constructed depressions to define positions of the integral pads when the monolithic wall is cast, and the form also includes a specially curved surface to provide greater strength and a better release of the form from a cast wall.

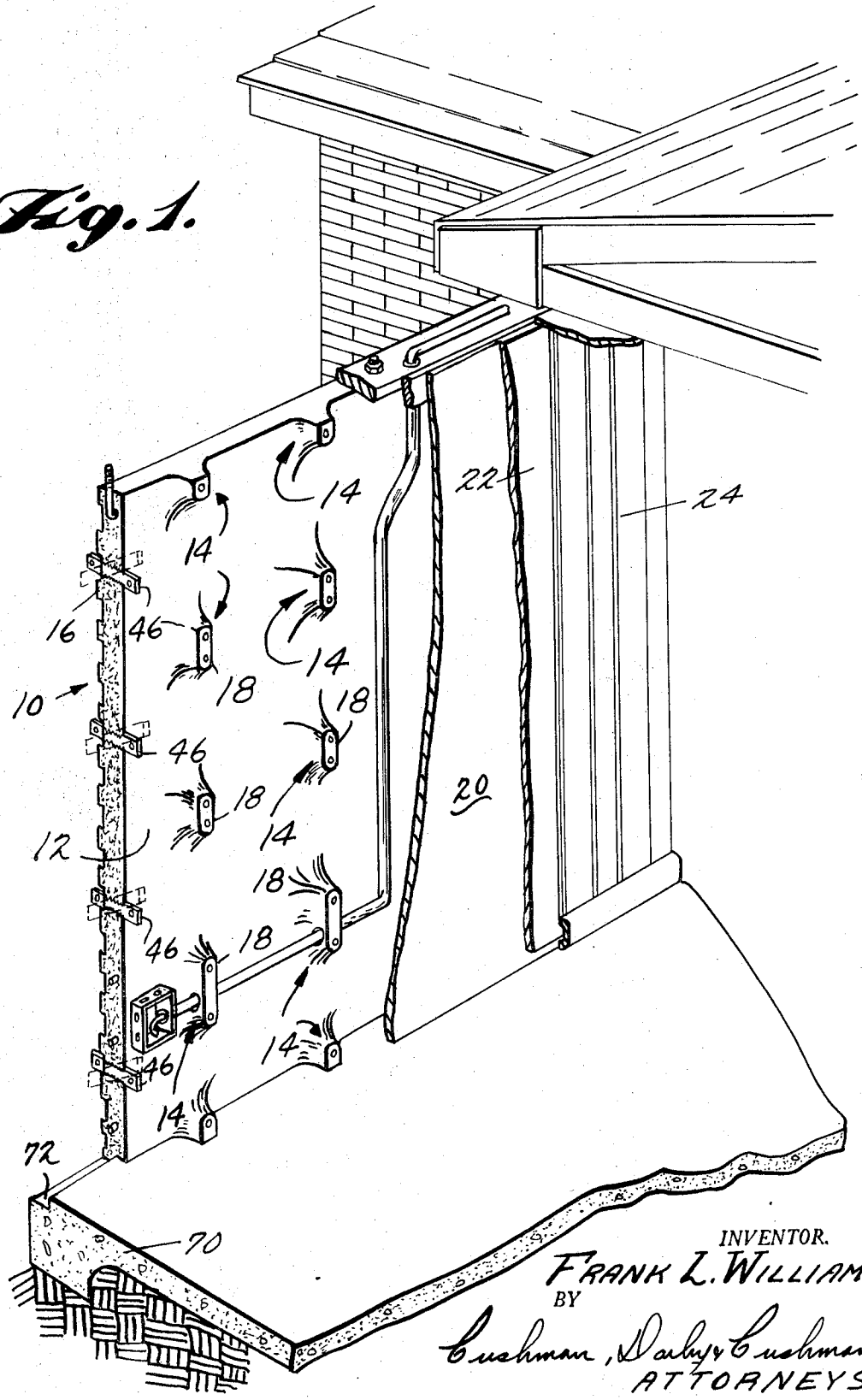


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SHEET 1 OF 4

Fig. 1.



INVENTOR.
FRANK L. WILLIAMS
BY
Cushman, Darby & Cushman
ATTORNEYS

Fig. 2.

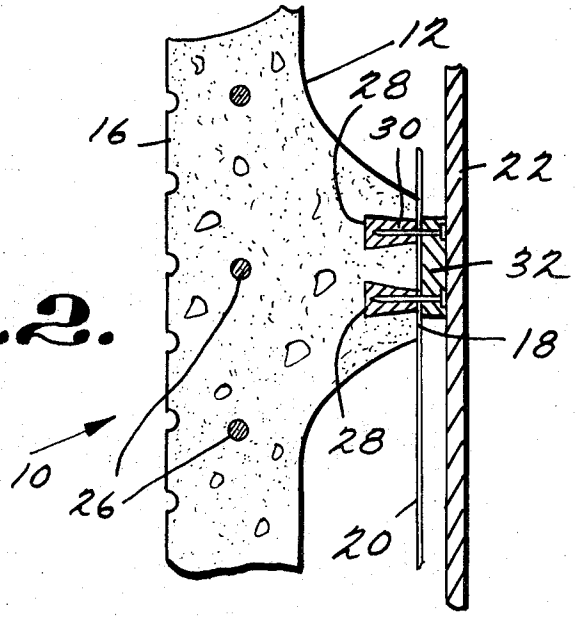
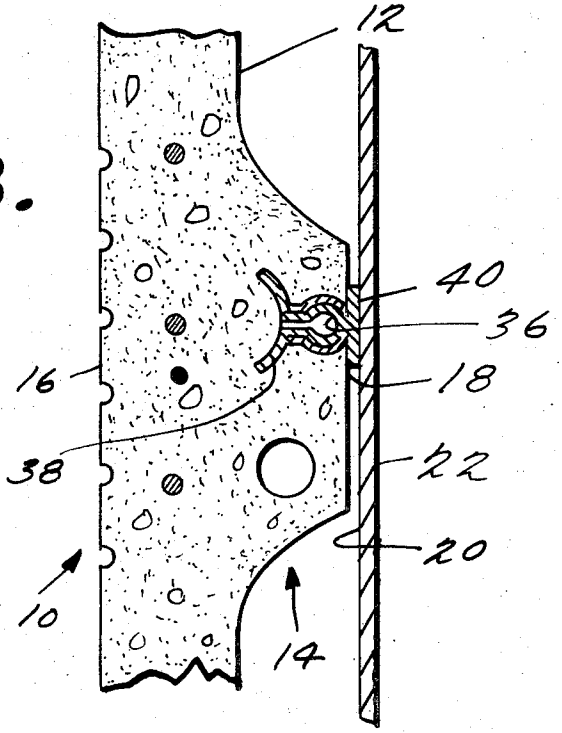
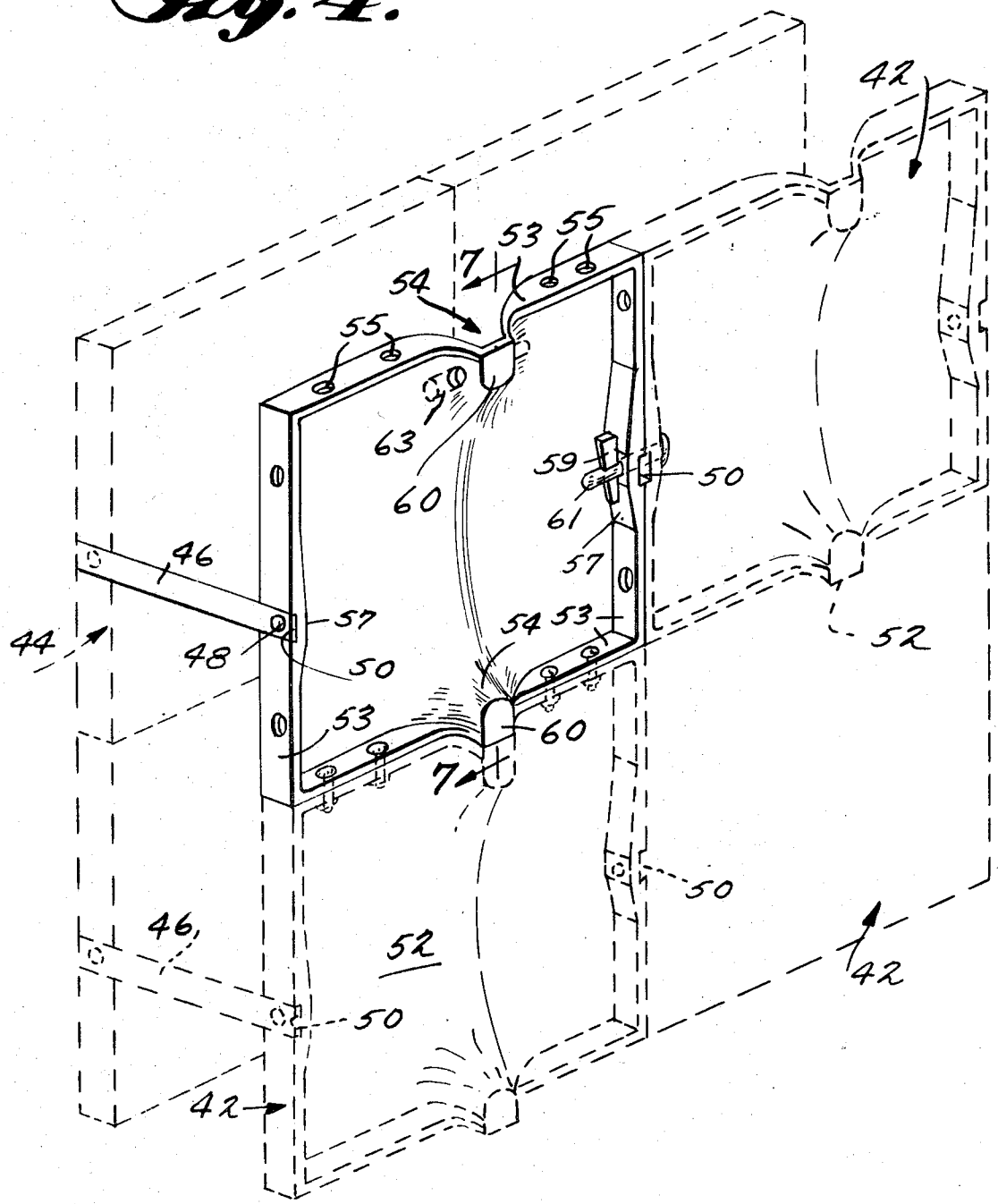


Fig. 3.



INVENTOR.
FRANK L. WILLIAMS
BY
Cushman, Darby & Cushman
ATTORNEYS

Fig. 4.



INVENTOR.
FRANK L. WILLIAMS
BY
Cushman, Darby & Cushman
ATTORNEYS

Fig. 5.

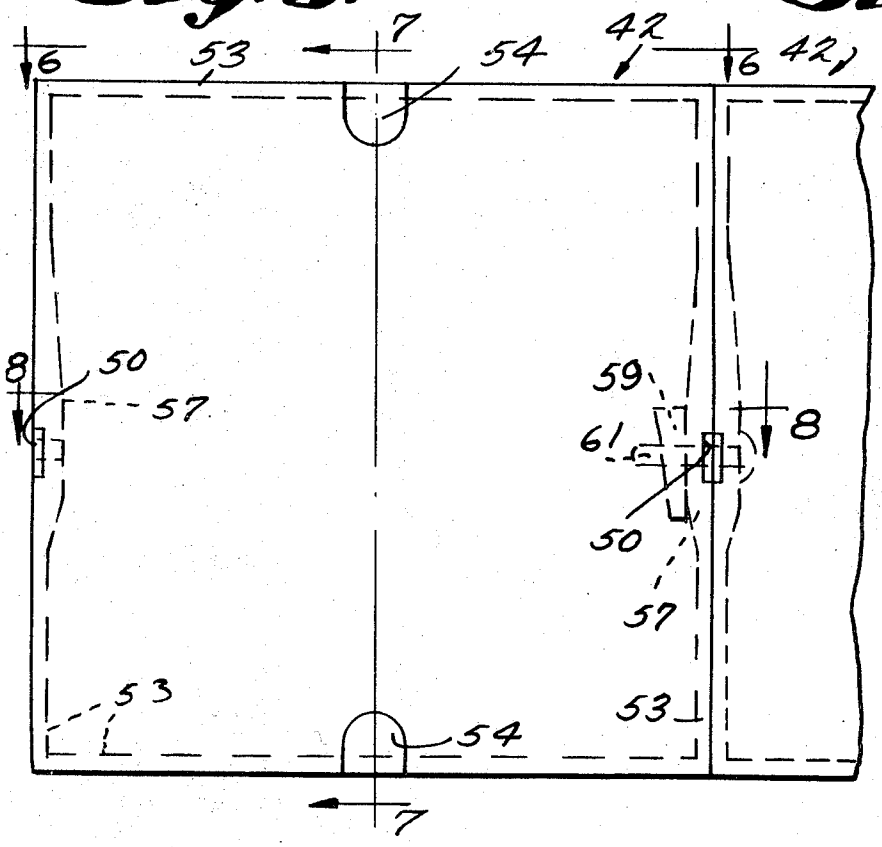
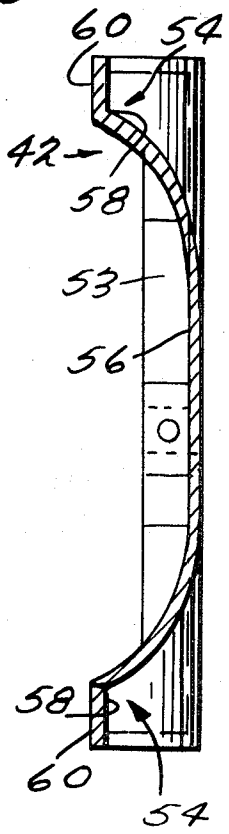


Fig. 7.



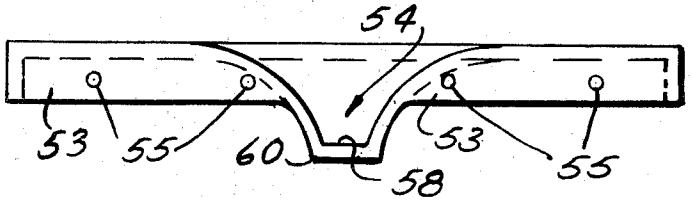


Fig. 6.

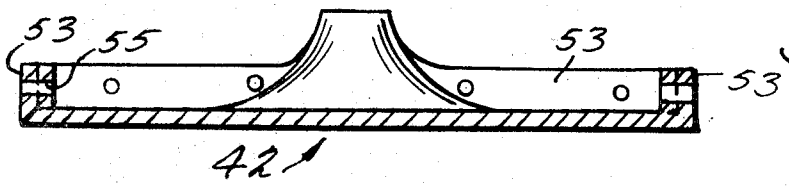


Fig. 8.

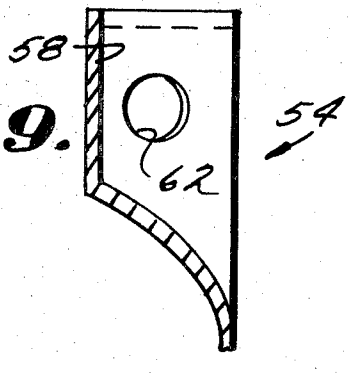


Fig. 9.

INVENTOR.
FRANK L. WILLIAMS
BY
Cushman, Darby & Cushman
ATTORNEYS

FORM FOR MONOLITHIC CONCRETE WALL CONSTRUCTION

BACKGROUND AND BRIEF SUMMARY OF INVENTION

It is known in the prior art to provide various types of forming devices which can be used to construct concrete wall structures. Early devices were assembled out of wood and were essentially destroyed after each use, but later development of the art saw the use of metal forms which could be erected to define a vertical space into which cement could be poured and cured to construct a monolithic wall structure. Attempts to use steel forms were largely unsuccessful because of the unwieldy weight of the forms and because of inherent problems of rust and corrosion with steel. Attempts were even made to combine metal frames with wooden panels or webs, as exemplified in U. S. Pat. No. 2,640,249 to Symons, but such forms did not have sufficient strength to support heavy stresses and loads, and were necessarily manufactured in relatively small units.

It is also known to manufacture forms out of lightweight metals, such as aluminum or magnesium metals or alloys, as recognized in the U. S. Pat. No. 3,307,822 to Stout. Lightweight metal forms or panels have the advantages of strength and light weight, thereby permitting their manufacture in larger sized units which can be quickly and economically assembled to define a mold for the casting of a wall or building structure. However, certain lightweight metal construction forms have a serious disadvantage of tending to stick to freshly poured concrete, and this results in a real difficulty in removing such forms from a hardened concrete construction. The problem of sticking is overcome in the Stout U. S. Pat. No. 3,307,822 by use of a special mold surface configuration, and my own pending patent application Ser. No. 426,885, filed Jan. 21, 1965, discusses a provision for a non-sticking film on aluminum mold surfaces.

Another development which is taking place in this art is the increased use of monolithic techniques and constructions in the erection of residential and relatively small commercial buildings. Formerly, monolithic casting techniques were limited to the construction of warehouses and other buildings which required little decorative "finish" to the completed structure, but the contributions of the Stout U. S. Pat. No. 3,307,822 permit a more extensive use of such techniques in constructing foundations for dwellings, and other buildings, which include a simulated brick or stone surface on the completed structure. However, monolithic wall constructions still have been somewhat limited in their applications to the residential and small building market because of Federal Housing Administration requirements for hollow wall constructions in such buildings. The requirement for a hollow wall construction is mainly one of providing a vapor barrier or insulating space in walls of buildings which are intended for use as habitats, and therefore, completely solid concrete wall constructions have been unsuitable and have been limited to use in foundations and other specialized applications.

The present invention is concerned with improvements in monolithic wall constructions which are suitable for residential buildings, and which meet all building code regulations and requirements, and further, the invention provides for an improved construction form which is useful for casting monolithic concrete walls.

The improved monolithic wall construction of this invention includes a plurality of spaced mounting pads which are formed integrally with the cast wall, and the mounting pads function to receive sheet material, or other building elements, in an attached, but spaced, relationship to the completed wall construction. Thus, there is provided in the finished wall construction a monolithic wall having finishing sheets or panels attached to at least one face of the wall so as to provide a dead air space or insulating space between the concrete wall and the finishing sheets or panels. It is known in the prior art to utilize concrete building blocks to assemble walls having spaces therein, and it is also known to provide such building

blocks with projecting ridges, as exemplified in Staman U. S. Pat. No. 2,008,775. However, the present invention is concerned only with the construction of a monolithic wall or building which is cast at the building site from a single pouring of concrete. The advantages in the present invention reside in eliminating a requirement for using separate building blocks, especially separate building blocks that have unusual and costly variations in their shapes and configurations. Also, the present invention eliminates the usual requirement for costly skilled labor who must lay up masonry blocks or units, and the finished wall construction of the present invention has the advantage of including no cracks, seams, or joints of the type which are normally found in constructions using building units which are mortared together.

The invention also provides for a novel construction form unit which may be made from an aluminum or magnesium metal or alloy. The construction form includes a special configuration for producing spaced mounting pads on the finished monolithic wall structure, and the form is designed in such a way that only a single configuration of a form is required to produce essentially all of the mounting pads which are to be formed integrally with any given wall construction. As discussed in the Stout patent, referred to above, it is intended that the metal forms which are used for casting monolithic structures be of a relatively large size, and a number of such forms are assembled together in an edge-to-edge relationship so as to define whatever size and shape of monolithic construction is desired. Since the initial manufacture of such forms is fairly costly, it is desirable to be able to manufacture a single configuration of form which is useful for producing substantially all of the monolithic structure which is being built. Accordingly, the provision of a novel, lightweight metal form, which can be used to produce a wall surface having integrally formed, spaced pads thereon represents a substantial advancement in the art.

The invention also provides for a novel construction form unit wherein a preferred curve is constructed into a web surface of the form so as to transmit forces and stresses to reinforced marginal edges of the form. Also, it has been found that the provision of a curved configuration in the web surface of a form causes the form to release itself from a hardened concrete wall which has been previously poured against the form. The theory for the release of the form from a hardened wall is not entirely understood, but it is believed that preferred parabolic curvature of the form web results in a flexing of the form in response to temperature changes, and this flexing causes the form to release itself away from the hardening surface of a wall. Of course, it is very important to be able to release such forms from the extensive surfaces which are being produced, and the releasing and stripping of forms from hardened concrete surfaces has been a major problem in the use of metal forms in this art. The stripping of forms becomes especially difficult where unusual surface configurations are being cast onto the wall which is being constructed, and therefore, it has become increasingly important to be able to remove metal forms from finished construction without damaging the surface features which are intended to be a part of the finished construction.

The finished wall construction of this invention provides a plurality of spaced pads, of special configuration, formed integrally with the entire wall. The pads may additionally include anchoring elements which are cast in place at the same time the pads are being formed, and the anchoring elements function to receive fastening devices for attaching sheet material, or other building elements, to the finished wall. When sheet material is attached to a plurality of such mounting pads on a monolithic wall surface, a space is provided between the main body of the monolithic wall and the sheet material which is being added. This space satisfied FHA requirements for an insulation space in hollow wall constructions. The mounting pads which are formed integrally with the monolithic wall may also include through passages which are formed at the same time the pads are being cast with the wall,

and the through passages provide convenient supports for electrical conduits, or other utility lines, which are necessarily included within a finished wall construction for a residential type of building.

These and other features of the present invention will be discussed in greater detail below, and in the detailed discussion reference will be made to accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of a completed monolithic wall which has been cast in accordance with the present invention, and a portion of the wall and the building in which it is to be included are cut away to illustrate detail;

FIG. 2 is a vertical cross-sectional view of a portion of the monolithic wall which includes a projecting pad member having one type of anchoring means included therein;

FIG. 3 is a vertical cross-sectional view, similar to that shown in FIG. 2, illustrating a second type of anchoring member cast in place in a second embodiment of a pad;

FIG. 4 is a perspective view of a preferred construction form which is used to produce the novel wall construction shown in FIG. 1;

FIG. 5 is a plan view of the form shown in FIG. 4, illustrating a reverse side of the form;

FIG. 6 is a top view looking down upon an edge of the form of FIG. 4;

FIG. 7 is a vertical cross-sectional view of the form, as seen on line 7–7 of FIG. 5;

FIG. 8 is a horizontal cross-sectional view of the form, as seen along the line 8–8 of FIG. 5; and

FIG. 9 is a view of a further embodiment of the pad forming means associated with the form.

DETAILED DESCRIPTION OF INVENTION

Referring to FIG. 1, a completed wall portion is illustrated as it would appear in a typical residential type of building, and the wall construction includes a novel monolithic wall 10 which is cast from concrete so as to form an inner surface 12 having a plurality of pad means 14. The inner surface 12 of the wall construction is substantially planar with the exception of the pad means 14 and curved portions of the wall surface which curve outwardly from the wall to form the pad means. The particular curvatures of the wall will be discussed in greater detail with reference to a novel moulding form which is used for producing the illustrated monolithic wall construction. An outer surface 16 of the wall may be formed to include any type of surface configuration which is desired, and typically, the outer surface is formed with a brick pattern in accordance with the teachings of Stout U. S. Pat. No. 3,307,822, which is incorporated herein by reference.

The plurality of projecting pad members 14 function as mounting surfaces to which additional building elements may be added for finishing a wall construction suitable for residential use. The mounting members 14 project outwardly from the planar surface of the wall 10 for equal distances, and each pad means includes a flat mounting surface 18 which is substantially parallel to the planar surface of wall 10.. The pad means are preferably spaced apart from one another at distances which provide for an adequate mounting and fastening of standard wall panels, such as available wallboard and plasterboard products, and a typical construction will provide pad members 14 approximately 2 feet from each other in vertical and horizontal directions. By forming integral pad members with the casting of the monolithic wall 10, there is provided an immediate means for finishing the interior of a building or room which is being constructed by concrete casting techniques. Further, there is no requirement for skilled labor to lay and select specialized block structures to provide mounting means on the inner surface of the monolithic wall, and there is no requirement for an addition of wooden studs to the interior wall surface prior to completion of the wall with the addition of wallboard or plasterboard. Thus, there is provided a substantially improved, low-cost structure which permits rapid building of residential type constructions with a minimum of skill and labor; and there is also provided a cast integral structure which fully meets FHA requirements for hollow walls in buildings which are to be used as living areas. As shown in FIG. 1, and also FIGS. 2 and 3, the building wall is completed by the addition of wallboard or panel boards to the inner surface 12 of the concrete wall. The FIG. 1 illustration shows portions of an optional vapor barrier 20, a wallboard 22, and a prefinished wooden panel 24, all cut away to show their relative placement over the inner surface of the wall 10. With the finishing elements in place, and fastened to the pad members 14 in a manner which will be described below, the completed wall provides for a strong, integral concrete structure having a required dead space between an outside portion of the wall and an inside portion of the same wall. The provision of a dead air space, or insulating space, is a necessary one for most residential constructions. Optionally, the space which is provided between the inner surface 12 of the wall 10 and the sheet elements which are attached thereto may be filled with an insulation material, and also, it is contemplated that the illustrated spaces formed around the projecting pad means 14 may function as passageways for carrying heated or cooled air to various portions of the room and to outlet registers which are positioned in desired locations within a room. The monolithic wall 10 may also include reinforcing rods 26 which are put in place prior to the pouring and casting of the wall structure. The vapor barrier 20 may be in the form of a plastic sheet material, or a coated paper which is constructed to seal out moisture from the interior of a building. Alternatively, a metal coated paper or foil may be used to function as a heat reflector in climates which require such additional protection.

FIGS. 2 and 3 illustrate the pad means 14 in greater detail, and the illustrations of FIGS. 2 and 3 are taken in vertical cross sections from the wall construction which is shown in FIG. 1. FIG. 2 illustrates a typical arrangement wherein anchoring means 28 are included within the construction of the pad means 14. The anchoring means may be in the form of tapered wooden blocks, as shown, and these blocks may be preplaced in moulding forms which are used to produce the novel wall structure shown. By including tapered wooden blocks in the pad means, a wooden surface is presented on a portion of the mounting surface 18 of each pad means. This wooden surface functions to receive fastening members which are used to attach building panels, or other building elements, to the interior of the concrete wall. Although the building panel may be attached directly to the pad means 14 by the use of nails 30, it is preferred to first nail a furring strip 32 across adjoining pad means so as to present a surface 34 which can be glued, or otherwise fastened, to the wallboard or panel board which is being used. FIG. 2 also illustrates the positioning of a vapor barrier 20, which may be added to the inner surface at the same time that the furring strips 32 are being put in place.

FIG. 3 illustrates an additional method of attaching wallboard, or other building elements, to the pad means 14 associated with the inner surface of a monolithic wall structure. In the FIG. 3 embodiment, a different form of anchoring means 28 is cast in situ in the pad means 14, and the anchoring means may be in the form of an open ended spherical unit which is constructed to receive a plastic or metal snap fastener 36. The anchoring means may be made of metal, or other suitable material, and it may include leg members 38 for assuring a tight fit within the cast pad means 14. With the embodiment shown in FIG. 3, snap fitting fastener elements 36 can be adhered, in spaced positions, to whatever sheet material or wallboard material 22 is being attached to the interior surface. The fastener elements may be attached by adhesive which is applied to flat surface portions 40 to effect a tight and secure attachment of fastener elements to the sheet material being used. It will be appreciated that the embodiment of FIG. 3 provides for a very rapid, and low cost, method of finishing the wall structure which is illustrated in FIG. 1 by the use of build-

ing sheets which have been previously fitted with fasteners. The fasteners may be quickly applied to the backs of building sheets with jigs designed to accurately place all fasteners for a given sheet at the required spacings. No specialized labor is required, and it is merely necessary to quickly insert all snap fasteners of each sheet of building material into the projecting pad means 14 by pressing the sheet and fasteners against a plurality of pads.

FIGS. 4 through 9 illustrate a preferred and novel construction form which is utilized for producing the monolithic wall 10 of FIG. 1. The form 42 is preferably made from a lightweight metal material, such as aluminum or magnesium metal or alloys of those metals. It is essential that the form be sufficiently light in weight to be easily handled at a building site where a plurality of such forms are assembled together in edge-to-edge relationships so as to define the walls of a monolithic structure which is to be cast from essentially a single pouring of concrete. The assembly of such forms is illustrated in the Stout U. S. Pat. No. 3,307,822, and in my copending application Ser. No. 426,885, and generally, a sufficient number of the individual forms 42 are assembled together to provide whatever dimensions are required for a completed wall or building structure. Typically, a plurality of the assembled forms are erected in two vertical rows which are spaced from one another so as to define a space therebetween which receives poured concrete. The two vertical rows of assembled panels contain the poured concrete and define surface configurations for inner and outer surfaces of a completed wall structure. Also, it is a practice to erect a sufficient number of rows of such forms to define all four walls, or whatever number are being cast, of a building, and then, the entire structure can be cast from concrete which is poured as rapidly as the structure can be filled. After the poured concrete has set and hardened for a length of time (as little as 24 hours), the metal forming units 42 can be stripped and disassembled from the hardened monolithic wall which has been cast. In this manner, an entire wall or building can be completed in a very short time and with a minimum of skilled labor and expense.

FIG. 4 illustrates a perspective view of one form unit 42, and the relationship of the form unit 42 of this invention to another row of such units is shown in dotted lines by the separate unit 44. The relationship which is shown in FIG. 4 produces the wall structure shown in FIG. 1. Tie bars or straps 46 are secured between spaced rows of the forms so as to maintain the proper spacing of the forms while concrete is being poured and hardened. The tie bars 46 are secured to the forms by pin means 48 which pass through openings in the tie bars. The tie bars 46 are positioned in recesses 50 which are provided in the frame portions of each form unit, and the recesses 50 accommodate one-half the thickness of each tie bar 46. The construction form unit 42 which is illustrated in FIG. 4, is shown as viewed from a surface of the unit which does not contact the concrete wall which is being produced. Thus, the FIG. 4 may be considered as illustrating an outside surface of a construction form, and it is to be understood that concrete is poured between a plurality of assembled forms 42 and 44 so that an opposite surface of the illustrated form 42 is contacted by concrete. The construction form 42 includes a web portion 52 which makes up the main body of the form. Marginal edges of the form unit are reinforced by outwardly projecting flanges 53 which are an integral part of the entire form and which also function to permit an assembly of a plurality of such forms in edge-to-edge relationship in both vertical and horizontal directions. In a typical installation, the individual forms measure 24 inches by 24 inches and a series of such forms are bolted together through openings 55 in their top and bottom edges to form elongate assemblies of the requisite height for the wall being formed. These assemblies may then be erected at the building site and connected to each other through their vertical side edges. The side edges of adjoining elongate assemblies are pinned and wedged together somewhat in the manner illustrated in Symons U. S. Pat. No. 2,640,249. Thicker sections 57 of the flanges 53 reinforce the side edges of the forms and also function as wedging surfaces against which a wedge member 59 may bear when they are driven through slots in bolts 61, for securing adjoining forms together.

FIG. 4 also illustrates a provision for depressions 54 which are formed into the construction form unit at opposite marginal edges so as to provide cavities into which concrete may move when it is being poured. The depressions 54 are constructed in a special configuration so as to produce the pad means 14 discussed with reference to FIGS. 1 through 3. In the preferred arrangement, each of the depressions 54, of a given construction form unit, defines one-half of a complete pad means 14, and the reason for this arrangement is to provide for the formation of a strong and integral pad means which will not be broken from the surface of the wall when the forms 42 are removed. Also, it is important that the forms 42 be constructed so as to be easily stripped or removed from set concrete without damaging the poured and cast concrete wall. It has been the experience of those working in this art that metal forms of certain configurations are practically impossible to remove from a completed concrete wall, and in fact, there have been instances of walls having to be essentially destroyed to separate the separate metal forms therefrom. The importance of being able to easily strip a metal form from a hardened concrete wall becomes even more important where substantial formations are to be included in the surface of the concrete wall, and in the wall of this invention, the pad means 14 project outwardly for a distance which is approximately equal to the thickness of the wall itself. For example, a strong and sound wall construction for residential use can be cast with a thickness of approximately 4 inches for the main body of the wall, and the pad means 14 may extend outwardly for an additional 3 ⅝ inches from the inner surface of the wall. Without a special construction for forms 42, it would be virtually impossible to remove such metal forms from a completed wall where such a sizable projection of concrete is hardened into depressions included within the forms. It has been found that a preferred placement of the depressions 54, together with a preferred curvature for adjoining portions of the form around the depressions, results in a superior forming unit which not only produces the desired pad means shown in FIG. 1, but which also is easily stripped from a hardened monolithic wall structure.

Referring also to FIGS. 5 through 8, it can be seen that the depressions 54 are ideally placed at opposite marginal edges of the form 42. This placement permits an easy withdrawal of the form away from the projecting pad means 14 which has been cast into a wall structure, and it can be seen that the two separate depressions 54 for each form 42 define two separate halves for two projecting pad means 14. Also, the placement of the depressions 54 at opposed midpoints along marginal edges of the form 42 permits the formation of a continuous curve 56 into the moulding surface, and also the outer surface, of the form 42. The curve 56 extends between low points of the opposed depressions 54, as viewed from the inside of the mould which is to contact the concrete wall, and the curve is substantially continuous and coextensive with the main body of the form so as to provide the curvature shown in the cross-sectional view of FIG. 7. The horizontally extending curvatures of the mould 42 at the positions of each of the depressions 54, are shown in FIG. 6, and it can be seen that the depressions 54 are constructed to provide a very smooth and gradual blending of the main body of the wall which is to be produced into the projecting pad means which are formed integrally with the wall. This configuration assures a strong integral pad means which is not easily separated from or broken away from the main body of the wall when the mould units 42 are stripped away. Also, it has been found that the formation of continuous curves (which are preferably parabolic in their geometry) between adjacent pad members on a wall structure considerably strengthens the wall itself. Load forces on the wall are transmitted along the curved portions of the wall to

the stronger and thicker regions of the wall which define the pad members, thereby increasing the effective strength of the finished structure.

Each depression **54** is provided with a flat bottom portion **58** which becomes the planar surface **18** discussed with reference to the pad means **14** of FIG. **1**. The planar surface **18** is preferably oval shaped so that no angular corners are to be formed during the casting process. As seen in FIG. **5**, which represents a view of the form when looking toward the concrete-contacting face thereof, the entire surface is smooth and unbroken, and when a plurality of such forms are assembled together, a clean and uninterrupted inner surface of a wall is formed between all of the pad means **14**. Since the wall surface which is being formed in accordance with this invention is intended to be covered by other building elements, it is not too important whether seam lines can be seen in the cement surface of a completed wall where separate forms **42** were joined together. However, the mating flange edges **53** of the separate forms may be carefully machined to provide a very tight and straight fit which produces a smooth wall surface which is essentially uninterrupted by any surface seam line.

FIGS. **7** and **8** illustrate another important feature of the present invention wherein a preferred curve **56** is provided on one surface or the other of a form member, and preferably in one direction only, so as to provide an unusual flexing of individual form units **42** while a concrete wall is setting and hardening against their surfaces. It has been found that the provision of a curve **56** along one axis of a form results in a flexing of the form from temperature changes, and the flexing action causes the form to break away from concrete as the concrete hardens and begins to cure. Although the reason for the flexing action, and the unassisted release of the form from a concrete wall, is not entirely understood, it is believed that temperature changes from day to night, and perhaps heat from hydration of the setting cement, causes the entire form to bend about the curvature as it is expanded and contracted relative to a differing expansion and contraction rate for the curing and setting concrete. FIG. **7** illustrates the curve **56** as extending along a vertical central axis of a form, and where the form includes depressions **54**, it is preferred that the curve of the form extend between the midpoints of the depressions **54**. FIG. **8** illustrates a horizontal cross-sectional view of the same form, and it can be seen that there is no provision for a curved web portion in that direction of the form. Although the curved form is illustrated as being provided with the depressions **54**, it is to be understood that such a curved web formation may be provided in any form which is used in this art to construct monolithic wall structures out of concrete.

Although a number of curvatures appear to provide the desired results, it has been further discovered that a parabolic curve offers the greatest advantages because such a curve also functions to transmit load stresses from the curing concrete wall to the stronger and reinforced marginal edges of the individual form units **42**. In the configuration shown for FIG. **7**, load stresses are transmitted from the middle portion of the web of the form along the curve **56** and to the high points **60** of the depressions **54**. From there, the forces are carried around the marginal edges of the form **42**, and the provision of flanges **53** about the edges provides for additional reinforcement and strengthening of the entire form unit. With the forms of this invention, it is possible to safely pour and harden walls which are 24 feet high, or higher, and any known concrete mixture may be used in the pouring operation. It is not necessary, as with some prior art attempts, to use special lightweight concrete mixtures in the casting of an entire building or a wall of a building.

FIG. **9** illustrates a modified form **42** which includes a slightly different configuration for the depression portion **54**, as viewed in vertical cross section similar to that shown in FIG. **7**. The depression **54** is constructed to provide for the insertion of a metal pin member through sidewall openings **62** which may be formed in opposite sidewall portions of the depression part of the form. The sidewall openings are arranged to receive a tapered metal pin member (see optional pin **63** in FIG. **1**) during the pouring of concrete, and after the concrete has hardened, the pin may be removed. This arrangement permits transverse passageways to be formed in the pad means **14** while the entire monolithic wall structure is being poured. The provision of transverse passageways in the pad means **14** permits utility lines and other structures to be installed within the confines of a completed wall, and there is no requirement for adding additional mounting brackets or devices to the inner wall surface before making such installations.

Having described the structural features of the novel forming unit of this invention, and having discussed novel wall products produced thereby, it can be seen that there is provided an efficient and economical system for erecting buildings which comply with good structural requirements and which offer advantages in strength and integrity not found in other types of masonry constructions. Referring again to FIG. **1**, a building can be quickly and efficiently erected in its final form by first pouring a slab or footing **70** at the place laid out for erecting the building. The footing may be formed with a shelf **72**, as shown, and vertical steel rods may be inserted around the perimeter of the footing for reinforcing the walls which are to be cast around the base. Then, forming units may be assembled and laid out around the perimeter of the building, and the assembled panels may be erected to define two rows of panels for each wall which is to be poured. As is apparent in the FIG. **1** view, the half pads which are formed by individual form units conveniently join the floor to form a strong bond therewith and to provide anchoring points at the extreme upper and lower edges of the completed wall. If all four walls are to be poured at the same time, a double row of panels will extend all the way around the footing to define a pouring space for the monolithic structure. The panels are secured to each other by pins and wedges, as previously discussed, and once everything is in place, a suitable concrete mix can be poured. After the structure has hardened for a reasonable length of time, as little as 24 hours, the moulding units can be stripped away from the monolithic wall structure. After the moulding units are removed, the ends of the tie bars **46** can be broken off or pulled out to finish off the outer surfaces of the concrete wall and small amounts of grouting can be applied, as necessary. Then, the interior finishing panels can be attached to the pad means, and roofing and other finishing structures can be added.

Although the invention has been discussed with reference to providing pad means on an interior wall surface, it is contemplated that similar pad means may be provided on an outside surface where it is desired to attach a decorative panel or special building element to the outside surface. Also, the pad means on inside surfaces may be used to carry decorative structures other than the described wall boards, and screens and partitions may be attached to the pad means in the same manner as described for wallboard sheets. It is further contemplated that special pad members may be formed at requisite intervals along an inner wall structure for supporting electrical junction boxes and similar fixtures. For example, pads may be formed with a lesser projection distance than regular pad formations to accommodate the thickness of a junction box which is to be attached to the specially formed pad within the wall. A further variation in this invention is shown in FIG. **1** with respect to the tie bar elements **46**. The tie bars **46** may be slanted downwardly toward the outside of the wall to be formed (as shown in dotted lines) so that when the tie bars are removed or broken off there will be less possibility of water or moisture seeping back through the finished wall at the location of the tie bars.

Variations and equivalent structures of the above disclosure will become obvious to those skilled in this art, and obvious departures from the teaching of this specification are intended to be included in the scope of the claims which follow.

I claim:

1. In a wall construction form made out of aluminum or other lightweight material which can be easily handled to produce monolithic wall structures from a pourable and settable material, said construction form having a web portion for defining a surface portion of the monolithic wall, with projecting edge portions around said web portion for permitting a temporary assembly of a plurality of such forms with one another to produce a wall or building structure, the improvement in said construction form comprising: at least one depression formed in a surface of the form which contacts a wall being produced, said depression having a substantially flat bottom so that the depression functions to define at least a portion of a discrete pad means which will project outwardly from the completed wall to provide a mounting and supporting means for attaching additional building or decorative elements in spaced relationships to the completed wall, said at least one depression further having curved surfaces extending from its bottom to adjoining surface areas of the form so that a moundlike pad shape is formed in the wall being produced, and including additional curved surfaces on an opposite surface of said form, said opposite surface being out of contact with a wall being formed and said curved surfaces spreading away from each of said depressions to reinforce said form and to assist in the release of the form from a monolithic wall.

2. In a wall construction form made out of aluminum or other lightweight material which can be easily handled to produce monolithic wall structures from a pourable and settable material, said construction form having a web portion for defining a surface portion of the monolithic wall, with projecting edge portions around said web portion for permitting a temporary assembly of a plurality of such forms with one another to produce a wall or building structure, the improvement in said construction form comprising: at least one depression formed in a surface of the form which contacts a wall being produced, said depression functioning to define at least a portion of a pad means which will project outwardly from the completed wall to provide a mounting and supporting means for attaching additional building or decorative elements in spaced relationships to the completed wall, said depression being positioned at a marginal edge of said form so as to define one-half of a pad means to be formed integrally with said monolithic wall, with an adjoining half of a pad means being formed insert assembly of such forms, whereby the forms may be easily stripped from the completed wall structure without damaging the integral pad means which are formed therewith.

3. The improvement of claim 2 wherein said depression is defined by smoothly curved surfaces extending from a substantially planar surface of said web to a substantially planar surface which is parallel to the web and which defines the mounting and attaching surface of a completed pad means.

4. The improvement of claim 2 wherein two depressions are provided in a single construction form, with each of said depressions defining a half of a pad means, and with said depressions positioned on said form to align with identical depressions formed in identical forms when said forms are assembled in an edge-to-edge relationship, whereby only a single configuration of form is necessary to produce extensive monolithic structures having a plurality of projecting pads formed integrally therewith.

5. The improvement of claim 4 wherein each depression is defined by smoothly curved surfaces extending from a substantially planar surface of said web to a substantially planar surface which is parallel to the web and which defines the mounting and attaching surface of a completed pad means.

6. The improvement of claim 2 and including an opening through a projecting sidewall portion of said depression for receiving a pin member which can be inserted transversely across the depression so as to form a transvers passageway through the pad means which is to be formed.

7. The improvement of claim 2 and including means for positioning an anchoring means at the base of said depression so as to include said anchoring means as an integral part of the completed monolithic structure which is being formed.

8. The improvement of claim 2 and including a curved outer web surface for said form, the curvature of said outer web surface being coextensive with an outer surface of said depression which is formed in the opposite face of the form, said curved outer web surface functioning to transmit forces to marginal edge portions of said form and to thereby increase the strength of said form.

9. The improvement of claim 8 wherein said outer web surface is curved in a single direction only and wherein the curvature of the surface is parabolic.

10. The improvement of claim 4 and including a curved outer web surface for said form, said curved surface extending between the positions of said two depressions which are formed into an opposite face of said form and being coextensive with outer surface portions of the depressions so as to transmit forces to said depressions and to marginal edges of the form, thereby increasing the strength of the form.

11. The improvement of claim 10 wherein said outer web surface is curved only in a single direction and wherein the curvature of the surface is parabolic.

12. The improvement of claim 1 wherein said curved additional surfaces are curved to include a major curvature in a single direction only with the major curvature being parabolic.