UNITED STATES PATENT OFFICE

BUILDING BLOCK AND METHOD OF MAKING SAME
Kenneth J. Tobin, Chicago, Ill.
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9 Claims. (Cl. 189—34)

1 This invention relates to improvements in building blocks and the methods of making and installing the same, and more particularly to building blocks of the character desirable for the erection of residences, commercial buildings, garages, and the like, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

I am aware that in the past many and various types of building blocks have been provided, both prefabricated and otherwise. These formerly known blocks, however, were highly objectionable in that they were undesirably expensive to manufacture and install, requiring an excessive amount of labor of a highly skilled variety to make the proper calking, put in the proper expansion joints, furring, load supports, accommodate conduits and piping, provide adequate insulation, etc. Further, blocks of the character heretofore used did not provide a finished interior of the character desirable in a residence. The only exception to that statement were the so-called glass blocks, and such blocks are clearly non-load supporting and consequently could only be used in panels with load bearing members disposed therearound, and the difficulty incurred in effecting proper calking, uniting the blocks one with the other, and providing means to compensate for expansion was tremendous.

With the foregoing in mind, it is an important object of the instant invention to provide a structural building block made of metal.

Another object of the invention is the provision of a structural building block made of a light-weight metal such as an aluminum alloy and which is designed to carry the structural load of the building as well as the normal live load, without the use of stringers, joists, pillars, columns, and similar load bearing devices.

Another object of the invention resides in the provision of a structural building block which may be very economically produced and installed, and which may comprise merely a simple metallic stamping, folded or shaped, and spot welded or equivalently secured in that shape.

Also a feature of the instant invention resides in the provision of a metallic building block of such construction that adjacent blocks are locked or welded together when laid, without the use of any mortar joints, resulting in extremely fast and economical laying of the blocks.

Also a feature of the invention resides in the provision of extremely light weight metallic building blocks which may be made of substantially any desirable shape.

2 The instant invention also seeks the provision of a metallic building block made of light metal, such as an aluminum alloy, possessing a high degree of reflectivity on its outer surface, and which may if so desired be clad or otherwise treated so as to provide a variety of external colors.

Another object of the invention resides in the provision of metallic building blocks made hollow so as to accommodate substantially any type of insulation or acoustic material therein, and which in view of the fact that the blocks themselves carry the building load, both structural and live, a greater cubical interior content results from fixed outside dimensions by virtue of the fact that the building wall need only be the thickness of the blocks themselves and thus is a comparatively thin wall.

Still another feature of the invention is the provision of metallic building blocks in which no provision, either by way of material or special joints, need be made for expansion, in view of the fact that the entire structure expands the same throughout.

Another advantage of the instant invention resides in the fact that the metallic blocks are very easily calked or sealed against the weather while being laid and without any special attention to the calking process, and the joining of the blocks one with the other results in a compressing and fixing of the calking.

Still another advantage of the instant invention resides in the fact that a light foundation may be used for a building by virtue of the fact that the blocks themselves are of extremely light structure.

Still a further advantage of the instant invention is embodied in the block construction, the blocks being prefabricated to accommodate pipes, wiring conduits, and the like.

It is also an object of this invention to provide hollow metallic building blocks which support the building load, and if any reinforcing is needed, that reinforcing may be provided within the blocks themselves, and without interfering with the adequate insulation of the blocks containing the reinforcing means.

Also an object of the invention is the provision of metallic building blocks with which any interior finish may be associated, the interior finish preferably being in the form of inserts held by means integral with the blocks, whereby the interior of a building may be changed at will without requiring skilled labor to effect the change,
or if desired, the interior may be made of a substantially permanent character.

One distinctive advantage of the instant invention is the fact that when the blocks are properly laid, provided with insulation therein, and the interior inserts mounted, the entire wall construction is finished including both outside and inside finish.

Another distinctive advantage of this invention resides in the fact that screened openings, glazed openings, and the like may be provided wherever needed and installed along with the laying of the blocks themselves and in substantially the same manner as the blocks are laid, the screened or glazed closures for such openings being prefabricated in similar manner to the blocks themselves.

It is a further object of the instant invention to provide a novel method of making and installing metallic building blocks.

While some of the salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the disclosures, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmentary external elevational view of a wall section including a window made up of blocks embodying principles of the instant invention;

Figure 2 is an enlarged isometric view of one of the blocks itself looking at the outside of the block;

Figure 3 is an isometric view of the block itself looking at the inside thereof, and illustrating the manner of fabrication and shaping of the block;

Figure 4 is a plan view of the metallic stamping going to make up a single block, this figure showing the surface of the stamping which ultimately will appear on the inside of the block;

Figure 5 is a fragmentary vertical sectional view through the wall structure of Figure 1, taken substantially as indicated by the line V—V of Figure 1 looking in the direction of the arrows;

Figure 6 is a view of one of the blocks in elevation, looking inside the block, and illustrating the use of reinforcing means within the block;

Figure 7 is a vertical sectional view of the structure of Figure 6 taken substantially as indicated by the section lines VII—VII of Figure 6, including a showing of an inside insert in position in the block;

Figure 8 is an enlarged fragmentary transverse sectional view showing the joint between two superposed blocks, with the insulation removed;

Figure 9 is a top plan view of a corner block embodying principles of the instant invention;

Figure 10 is a top plan view of a radial block embodying principles of the instant invention;

Figures 9 and 10 being included to indicate that a block may be of substantially any desirable shape:

Figure 11 is an isometric view of a type of laminated insulation or acoustic material that may be used within the blocks; and

Figure 12 is an isometric view of a type of inside finish insert which may be utilized in connection with the blocks.

As shown on the drawings:

With the illustrated embodiment of the instant invention, referring to Figure 1, there is shown a wall section, generally indicated by numeral 1, and made up of a plurality of blocks 2. In this particular wall section, a window arrangement, generally indicated by the numeral 3, is provided, this window arrangement being set in position in substantially the same manner as the blocks themselves are set in position. By virtue of the staggered arrangement of the blocks in adjacent courses a plurality of substantially half-size blocks, as indicated at 4, will be necessary, the number depending upon the size of the window opening. These half-size blocks are of the same general construction as the full-size blocks and are only used to evenly finish off the edge of a wall adjacent a window or door opening, or in some instances, at a corner of the building.

With reference more particularly to Figures 2, 3 and 4, it may be seen that an individual block is preferably made up from a single blank shown in the flat in Figure 4. This blank may be stamped or punched from a sheet of metal, such as aluminum alloy, and is so shaped as to define a panel 5 which provides the outside surface of the block. This panel has a projection 6 on each of three sides thereof, which projections may extend from end to end of the respective side of the panel if so desired. In other words, these projections are not fixed as to size, but may be as large as deemed most expedient. Each projection is provided with a groove 7 embossed therein, the closed side of the groove formation being visible in the showing in Figure 4.

One side of the outside panel 5 is integral with an elongated band-like portion, generally indicated by numeral 8. This portion may be provided with a plurality of score lines 9, shown dotted in Figure 4, defining lines of fold for the band portion. This band portion is also provided with a pair of grooves 10—10 spaced from each other and extending the entire length of the band, these groove formations 10—10 being just less in size than the aforesaid groove formation 7 on the projections or side tabs 8 of the back panel. The band may also be provided at spaced intervals with suitable apertures 11, these apertures providing openings for the ultimate installation of pipes or conduits. In order to define a support for the inside finish insert, the band is also provided with numerous tongues 12 struck from the body of the band and bent at right angles thereto, there being two of these tongues for each section of the band in the illustrated showing, although any desired number and shape of such tongues may be utilized.

In forming one of the blocks 2 from the blank of Figure 4, the back panel 5 is folded upwardly, the side tabs 8 are turned inwardly, and the band is bent substantially at right angles along each of the lines of fold 9 and thus wrapped around the side tabs 8. After the folding operation has been completed, the band is spot welded or equivalently secured to each of the side tabs 6.

One end of the band may be turned as indicated at 13 in Figures 2, 3 and 4, and the opposite end portion of the band overlaps the turned part 13 and may be spot welded thereto if so desired. It will be noted that one portion of the band, that is one section, is longer than the others, and that projects beyond the construction proper as indicated at 14. When the blocks are disposed side by side along a course, portion 14 of one block overlaps the upper part of the next adjacent block, and may be spot welded to the next adjacent block in the region of the overlap. At the same time, adjacent side walls of adjacent blocks may be spot welded either one or a plurality of times to each other so that each block is effectively united to blocks on each side thereof, and blocks.
above and below, so that an entire wall is substantially an integral structure.

The spot welding may be accomplished, it being recalled that the box-like blocks are open on the inside, by use of a suitable implement that operates in the character of a pair of pincers and each time the points are pressed together a weld occurs. Thus, the positioning of the blocks and the welding of them together may be done very expeditiously and with a minimum amount of time and labor.

As indicated in Figure 8, a pair of superposed blocks may be spotted twice in line as indicated at 15. With blocks laid in courses as indicated in Figure 1, and each block spot welded to all blocks adjacent to it, it will be apparent that the blocks themselves will carry the structural as well as the normal or ordinary residential live loads and no addition load bearing structure is necessary.

In the event it is desired to strengthen the blocks for any purpose at certain points, it is a simple expedient to lay a staggered vertical course of blocks of the character seen in Figures 6 and 7. In these figures, blocks are shown provided with internal reinforcing in the form of a cross frame 16 having the ends of each leg of the cross reversely bent and spot welded or equivalently secured to the adjacent side wall of the block as indicated at 17. With reference to Figure 7, it will be seen that the cross arrangement 16 does not extend the full width of the block and so allows ample room for the positioning of the interior finish insert. The reinforcing 16 is preferably made with the same material as the block itself so that it will not only have the same strength as the block, but expand and in accordance with the block so that no provision need be made for reinforcing expansion.

With reinforcing in the block of the character seen in Figures 6 and 7, insulation 18 may be packed in the triangular spaces defined by the reinforcing. This insulation may be of substantially any desirable or suitable material. A satisfactory insulation is crumpled aluminum foil which not only affords a very high degree of heat insulation, but also is extremely light in weight, in keeping with the entire structure formed by the blocks.

Of course, it is desirable to seal or caulk the cracks between the blocks when they are laid in their courses. With the present invention, no particular and special attention is essential in order to provide proper caulking. The caulking may be provided in part automatically, and in part by a very simple operation. For example, as indicated in Figure 3, the vertical caulk may be provided upon the blocks. That is, the grooves 18 extend to an end portion of a block may have attached therein in any desired manner, such as by cementing, a suitable caulk 19 which may be in the form of substantially round strings or cords of caulking material. The caulking proper may be of any suitable material, preferably some insulating material that is easily handled. Satisfactory material may be strips of asphaltum, or a cord of rubber or rubber composition would be satisfactory. The caulk is substantially sealed in position when the blocks are properly laid, and so that caulking would have extremely long life, not being subject to the elements except to a relatively minor extent. In connection with the horizontal courses, the grooves 18 in the upper faces of the blocks, which grooves will be continuous throughout the entire course of the blocks may be provided with strings of caulking 20 as seen better in Figure 8. After a course or a portion of a course has been laid, it is a simple expedient to place the strings of caulking 20 in the grooves 18. Each string of caulking is preferably substantially twice the size of the grooves so that it will fill up the corresponding groove in the next adjacent block. When the blocks are laid into position, as seen in Figure 8, the caulking is compressed between the two blocks, and substantially sealed in place. The holding of the caulking results from the spot welding as indicated at 15, and the caulking can never leave its position unless the blocks are ripped apart. With the vertical caulk 19 already attached to one end of a block, that caulking is automatically placed in position when the next adjacent block in the horizontal course is laid.

The caulking also serves another function, in that it establishes a slight cushioning take-up between the blocks so as to compensate for the projecting portion 14 on a block. This projecting portion when overlying the next adjacent block provides an added thickness of material, and this added thickness of material is compensated for by the give of the caulk, so that the courses of the blocks will still be substantially level.

In the event the blocks do not have the reinforcing 16 therein, other types of insulation may be used, such for example, as illustrated in Figure 11. This insulation, designated 21, may be of the block type such as rock wool, Celotex, asbestos compound, or other suitable material. After the metallic blocks have been laid in position, insulation of the character of 21 may be inserted in the blocks, as also shown in Figure 5. Obviously, the insulation blocks 21 may be properly shaped to pass by the lugs 12 in the blocks, such shaping depending upon the thickness of the blocks. By way of example, it may be said that the metallic blocks themselves may be made in substantially any desirable size, such as, six, eight, or twelve inches square, and these blocks may satisfactorily be used with a thickness of four inches. In all cases it would not be necessary to have the insulation of a depth equivalent to the entire thickness of the block with the exception of the inside finish insert, but in many instances the insulation need only occupy half the thickness of the block or perhaps a lesser amount.

As to the inside finish of the building, and by inside finish is meant the ultimate interior decoration of the room, it is a simple expedient to use the building blocks as a holder for that finish. In the illustrated embodiment of the invention, a block 22, shown in Figure 12, may be pressed into the box-like metallic block against the lugs 12, as seen in Figures 7 and 8. This insert 22 may be of any desirable material such as glass, clay, wood, rubber composition, cork, linoleum, etc., and may have substantially any desired interior finish and color. Obviously with such an arrangement, it is a simple expedient to acquire color combinations in the interior of the room and provide borders, if so desired, with no more labor than required to provide an ordinary plain interior finish. If so desired, the inserts 22 may be cemented into position in the structural block, but in most cases that operation will not be necessary.

With reference to Figure 8, it will be noted that the inside edges of the structural blocks themselves may be skived or curved as indicated at 23, and the edge portions of the inserts 22 may
also be curved as indicated at 24 to add to the attractiveness of the interior finish by providing smooth joint lines between the insert panels. It is also a simple expedient to provide windows, and equivalent openings, in connection with the instant invention, the provision of such openings requiring no added or special attention on the part of the operator laying the blocks. By virtue of the staggered courses, as stated above, it would be necessary to use half blocks 4 in alternate courses adjacent such openings, as shown in Figure 1. Such half blocks are provided in substantially the same form as the regular size blocks with the sole exception of size and are handled in the same way. With reference more particularly to Figure 5, it will be seen that a window block generally indicated by numeral 25 comprises merely the band portion of a regular block without a back panel 5. The band is provided with the grooves to hold the calking, and the inside of the block, preferably inside the grove formations is a pair of spaced planes of glass, plastic, or other substantially transparent material. The spacing between the panes 26 functions as a dead air insulation space so that even the window openings may be properly insulated as well as the solid portion of the structure. In the illustrated embodiment, the window opening blocks are made of the same size as the regular structural blocks, but it will be appreciated that if desired the window openings may be in the form of a single block or the size of the entire opening, no added difficulty being encountered in installing the same. In the event it is desired to have a permanent and definite opening through the wall, for purposes of drainage, ventilation, and the like, it is a simple expedient to substitute screen for the glazing in the window blocks 5. In most cases, it will not be desirable to open a window, and this is especially true if the inside of the structure is air-conditioned. However, the glazing may be mounted upon a hinge mechanism so desired and still provide adequate insulation and permit the free opening of the window.

In Figure 9, I have illustrated what may be termed a corner block 27, the block being constructed in substantially the same manner as above described in connection with Figure 4, but given an arcuate shape so that if a rounded corner on the building is desired, the corner blocks may be laid in substantially the same manner as the side blocks.

Again, in Figure 10, I have shown what might be termed a radial or keystone block, if such may be desired in any portion of the structure.

The examples of Figures 9 and 10 are not in any manner conclusive, but are merely indicative of the fact that the blocks may be made in substantially any desirable shape to fit in with the architectural design of the building.

In constructing a building with blocks embodying principles of the instant invention, only a light foundation need be provided in comparison with foundations used for buildings constructed with materials heretofore known. This is because the blocks themselves, if made of an aluminum alloy or equivalently light metal, have little dead weight so that the structural load of the building is considerably less than in the case with other materials. After a foundation has been provided, it is a simple expedient to lay the courses of blocks, and spot weld adjacent blocks to each other at one or more points. In addition to the spotting of the side walls of adjacent blocks together, the overhang 14 of one block establishes a direct bond with an adjacent block. When the next course of blocks is laid in staggered relationship and on top of the first course, after the positioning of the calking elements 20-20, it is a simple expedient to spot the upper course to the lower course so that in effect the entire wall of the building is one integral, load supporting lightweight structure. If for any reason additional load bearing power is desired in certain portions of the structure, it is a simple expedient to incorporate reinforced blocks of the character seen in Figures 6 and 7. No change in the method of laying the blocks is required, and the only additional care necessary being that to place the reinforced blocks in the proper location. After the blocks have been laid, insulation may readily be added by merely filling in the box-like blocks from the inside of the structures. After the insulation has been so provided, the interior finish inserts may be pressed into the inside opening of each block. When that is done, not only is the structure complete, but the interior decoration of the wall is also provided at the same time and with relatively little cost. Such interior decoration may be semi-permanent in character, or may be changed as at will even by an unskilled occupant of the building. It is simply necessary, in effecting such a change, to pry out the inserts already there, and press in new inserts having the desired finish thereon.

The blocks themselves may be simple stampings or may be die drawn, or made in an equivalently economical manner. The blocks are preferably completed at the manufacturing plant and shipped to each job ready for installation. It will be noted that with blocks of this character the shipping load is light and a car may be filled to its volumetric capacity so as to take advantage of all space. Due to the shape of the blocks, their loading is simple and no special packing is required.

In the use of the instant invention, it will be especially noted that no particular pains need be taken or no real special attention given to the matter of calking. It is a simple expedient to lay the string-like elements 20-20 upon each course of blocks when that course is completed, and as above explained, the vertical calking is taken care of automatically provided each block has calking secured thereto at one end thereof. It should also be especially noted that no regard need be given expansion. No special provision for expansion need be made either by way of material, special joints, or in any other fashion, since all parts of the structure expand alike.

Further, it will be especially noted that the blocks are prefabricated for piping and conduits, and that all such wiring and plumbing installations may be effected in a ready manner prior to the placing of the insulation. If desired, heating elements may be installed directly in the wall, and a row of the blocks provided with open-work interior finish inserts to permit egress for the heat. Convenience outlets, wall brackets, etc., may be provided directly upon an interior finish insert so that no special attention need be given the placing of such items.

As to the external appearance, it will be noted that if the blocks are made of an aluminum alloy, or equivalently bright metal, the reflectivity will be extremely high and yet the structure will have a very pleasing appearance. If so desired, the metal of the blocks may be clad on the outer face so as to provide any desired color scheme.
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The economy both of manufacture and installation of the blocks and the resultant economy of the entire building structure is an item of major importance, so that nothing of the fact that greater cubical content for fixed outside dimensions is obtained. In addition, it may well be mentioned that the holding of the entire interior finish by clips or lugs struck from the blocks themselves adds to the economy of the structure, and the interior of the building may be soundproofed or otherwise acoustically treated merely by the use of interior inserts having that characteristic.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A hollow box-like metallic building block comprising a panel member and an integral continuous band member forming the side walls of said block, the free edges of said panel member having inturned portions for engagement with adjacent side walls to form a structural unit, said side walls having a peripheral groove for the reception of calcining and saddle peripheral groove cooperating with means carried by the inturned portions of the panel member to hold the panel member and side walls in alignment.

2. A hollow box-like metallic building block comprising a panel member and an integral continuous band member forming the side walls of said block, the free edges of said panel member having inturned portions for engagement with adjacent side walls to form a structural unit and a portion of said band continuing beyond the margin of said block for engagement with an adjacent block.

3. A hollow box-like metallic building block comprising a panel member and an integral continuous band member forming the side walls of said block, the free edges of said panel member having inturned portions for engagement with adjacent side walls to form a structural unit, said side walls having peripheral grooves which engage means carried by the inturned portions of the panel member for holding said block in alignment, a portion of said band continuing beyond the margin of the block for cooperation with similar grooves in an adjacent block to align and reinforce the same.

4. The method of making a hollow box-like metallic building block which includes the steps of forming a blank having an integral panel portion and a continuous band portion, providing the band portion with a peripheral groove and the free ends of the panel portion with members for cooperating with said groove, shaping said block by interengaging said cooperating members and groove, welding said members to said band portion, and securing a calcining strip in said peripheral groove.

5. The method of making a hollow box-like metallic building block which includes the steps of forming a blank having an integral panel portion and a continuous band portion with the band portion of a length in excess of the perimeter of the panel portion, providing certain of the free sides of the panel portion with inturned members and shaping the block by forming the band portion around said inturned members with the excess length of the band portion extending beyond the confines of the block.

6. As an article of manufacture, a hollow box-like metallic building block, including a base panel and side walls, one of said side walls extending beyond the confines of the block in the form of an overhang for lapping engagement with an adjacent block.

7. As an article of manufacture, a hollow box-like metallic building block, including a base panel and side walls, one of said side walls extending beyond the confines of the block in the form of an overhang for lapping engagement with an adjacent block, said side walls being corrugated to provide a peripheral groove wherein continues along said overhang to provide an interlocking engagement with a corresponding formation on an adjacent block.

8. A hollow load-sustaining metallic building block comprising a single blank including a back panel and a band portion integral with one side of said panel but extending therebeyond, a projection on each free edge of said panel, said band portion being corrugated to provide spaced grooves extending lengthwise of the band portion, said projections being of less width than the band portion and having a single groove therein, said blank being folded into the block with said panel forming the back face and said band portion forming the side walls, said projections being inturned with the groove formation interlocking with the adjacent groove formation of the band portion, and said band portion being welded to said projections.

KENNETH J. TOBIN.

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