

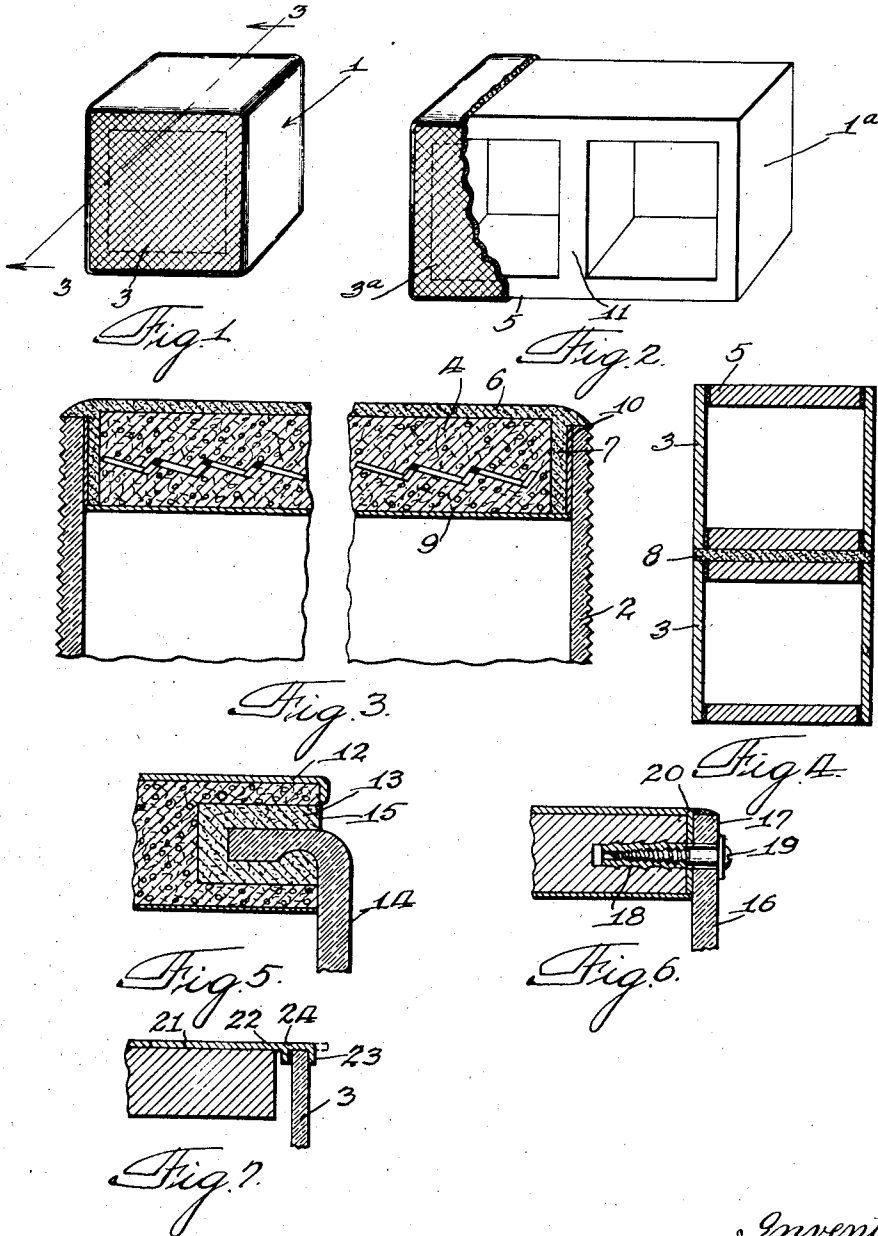
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G. D. KING ET AL
BUILDING BLOCK

2,158,982

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

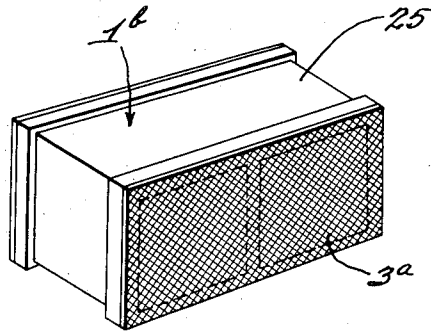


Fig. 8.

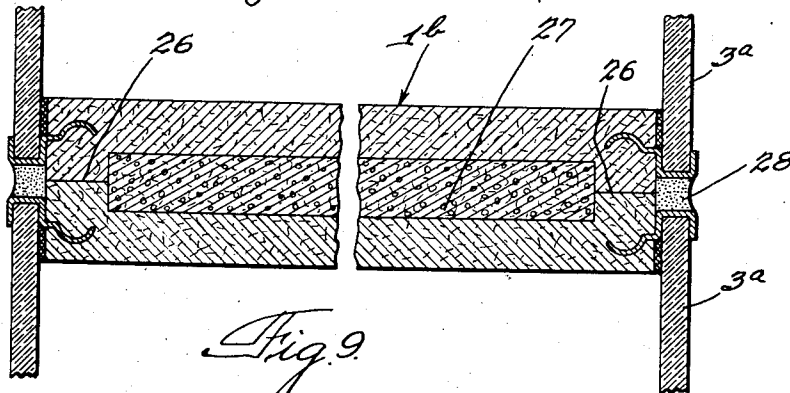


Fig. 9.

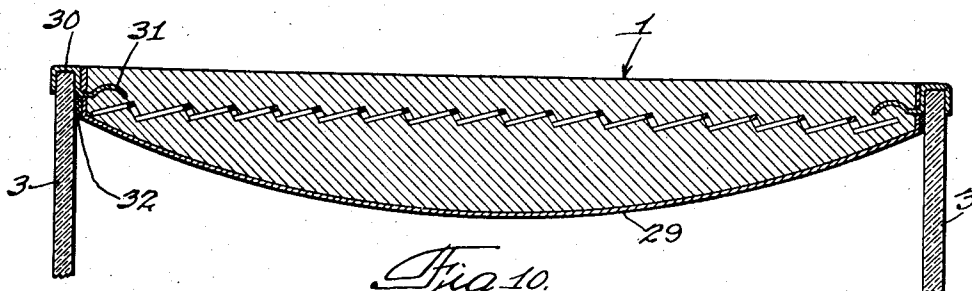


Fig. 10.

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BUILDING BLOCK

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19 Claims. (Cl. 72-41)

This invention relates to a building unit and more particularly to a hollow building block adapted for use in walls and particularly in self supporting walls wherein the blocks are arranged to permit light to be transmitted through the wall.

The invention more specifically contemplates a load supporting hollow building block comprising a shell which may have comparatively thick walls and open sides, and in which light transmitting facings are supported by the shell in a manner to close the open sides of the shell and enable light to be transmitted therethrough.

Glass masonry blocks are well known in the art and provide some advantages inherent in the material used. However, they are not entirely satisfactory. They cannot be used as load bearing units for the reason that relatively light loads create strains and stresses within the glass and cause it to crack, even when properly annealed. Even under non-load-bearing conditions these blocks are stressed, due to the weight of the blocks above, and it has been found that the addition of even a slight external force is sufficient to cause cracking and shattering of the already stressed glass units. A slight shock occasioned by vibration in the finished structure or by relatively weak impact may be sufficient to shatter a glass block. Also mere fluctuation in atmospheric temperature will often create a sufficient differential in expansion or contraction to cause the destruction of the glass unit. The relatively thinner portions of the glass block, such as the side walls, do not have a uniform rate of expansion or contraction under atmospheric conditions compared with the thicker portions, such as the corners. Thus strains and stresses are set up within the block itself, that can generally reach equilibrium only by cracking, usually at the corners.

When cracking or shattering occurs, due to one of the above mentioned causes, not only is the surface crack unsightly in itself but it permits the ingress of moisture and dirt, which cannot be removed from the unit, and which destroys a large percentage of the heat and sound insulating properties of the block. The result is an unsightly and structurally unsound glass unit, having little of its originally intended value. Due to these defects, inherent in the structure of the glass block, its use has been confined largely to what are essentially window sections. Thus steel or reinforced concrete lintels must be used over the heads of all openings containing ordinary glass blocks and, if panels of any considerable

size are to be employed, intermediate horizontal and vertical reinforcing is required. Such reinforcing usually takes the form of steel angle or channel sections attached to the masonry by various means and visible on one or both sides of the structure. Such reinforcing means are unsightly and detract from the intended visible effect of solid glass masonry surfaces. It is therefore an object of the present invention to provide a light transmitting building block of the character described wherein the individual blocks, and the wall constructed of such blocks, may not only be self supporting, but may support the usual loads to which walls in ordinary building structures are subjected, without the necessity of employing external reinforcing members, and which may therefore be used in large areas essentially as any other of the commonly employed masonry units.

A further object is the provision of a light transmitting building block in which provision is made for a sufficient differential in expansion and contraction of the various elements to prevent any material injury to any part of the block.

It is difficult, if not entirely impossible, to obtain an effective bond between the ordinary glass units and conventional mortar, as no water is absorbed from the mortar, thus greatly delaying the set. As a result the mortar tends to ooze out unevenly from between the blocks. Consequently the finished wall presents an uneven appearance of joints of varying width and blocks out of alignment and a workman can lay up but a few courses per day, having then to stop work until the mortar has set. To obviate this uneven settling and alignment of the glass units it has been found necessary to reinforce the horizontal mortar joints with expanded metal wall ties. However, even this has not satisfactorily remedied the difficulty. Of course, a bond may be obtained by using special mortars containing organic materials, such as plasticized nitrated cellulose or acetylated cellulose. These mortars however are expensive and also harden by gradual evaporation of the solvent, consequently there is the same difficulty with uneven joints and slowness of erection. If a good bond is not obtained, the differential in expansion between the block and the mortar will eventually cause small crevices to appear in the mortar and will thus establish an avenue whereby moisture, either in the form of vapor or liquid, can readily pass into the mortar joint and even through it on to the opposite side of the structure. This moisture may condense or even freeze and thus further promote the dis-

ruption of the bond and even cause damage to the glass unit itself.

It is therefore another object of the present invention to provide a light transmitting building block which will overcome the above noted objections whereby the blocks may be incorporated in either a load bearing or non-load bearing wall without the necessity for reinforcement, and in which the wall and individual units therein may be substantially moisture proof.

It is also an object to provide an improved light transmitting building block whereby the herein noted desirable results may be obtained and serious objections to prior structures avoided, as a result of an assembly comprising an improved shell structure of suitable material and characteristics in combination with various elements all of which are constructed and arranged to provide a block which may be conveniently assembled and which will provide suitable moisture resisting and load bearing characteristics in a finished wall; also the wall may present an attractive appearance.

It is apparent that the entrance of moisture either in the liquid or vapor phase into the interior of a building block of the type invented would under cool conditions condense the moisture vapor present therein and form an unsightly film within the interior of the block. For this reason it would be desirable to produce a block that has practically no moisture or water vapor within its confines. It likewise is apparent that the shell, the facings, as well as the adjoining means, should be thoroughly waterproof and vaporproof to prevent the ingress of moisture or water vapor into the interior.

A still further and additional object of this invention is to provide a light transmitting building block used as a load bearing unit and which is thoroughly resistant to the entrance of water or water vapor into its interior.

It is also an object to provide a light transmitting building block wherein the light transmitting facings may easily be repaired, or replaced, without disturbing other portions of the wall structure.

A further object is the provision of a light transmitting building block which may be used as a load bearing unit and which is so constructed that it will allow free expansion and contraction of the assembled elements used therein, and which will provide a substantially fire resistant wall.

Another object is the provision of a hollow building block having light transmitting side panels and a load supporting shell whereby a wall formed of the blocks will not only enable light to be transmitted therethrough, but will also provide substantial fire resistant characteristics, and wherein the wall will retain its load supporting characteristics at temperatures materially beyond the temperature at which the panels become ineffective.

Further objects will be apparent from the specification and the appended claims.

In the drawings:

Fig. 1 is a perspective view of a rectangular light transmitting building block, and illustrates one embodiment of the invention.

Fig. 2 is a perspective view of a light transmitting building block similar to that illustrated in Fig. 1, but somewhat elongated and provided with a partition.

Fig. 3 is a transverse sectional view taken on

a line substantially corresponding to line 3-3 of Fig. 1.

Fig. 4 is a diagrammatic view illustrating the blocks in position in a wall and with mortar therebetween.

Fig. 5 is a fragmentary sectional view through one wall of a block and its adjacent light transmitting facing and illustrates one method of supporting and sealing the facing.

Fig. 6 is a fragmentary sectional view similar to Fig. 5, but illustrates a somewhat modified form of securing the facings to the shell.

Fig. 7 illustrates still another method of securing the facings in a position to cover the open sides of the block.

Fig. 8 is a perspective view of a complete block and illustrates another embodiment of the invention.

Fig. 9 is a cross sectional view through the joint between adjacent blocks such as shown in Fig. 8 when incorporated in a wall.

Fig. 10 is a transverse sectional view of one wall of a block and illustrates a structure providing effective load bearing characteristics and reducing to a minimum the non-light-transmitting areas of the block.

Referring to the drawings in detail, the embodiment illustrated in Figs. 1 and 2 comprises a rectangular shell 1 having comparatively thick walls and open sides as illustrated, the open sides being covered and sealed by means of light transmitting plates or facings 3. By this construction, it will be apparent that light may be transmitted completely through the block and therefore through a wall in which the blocks are incorporated. The shell 1 is preferably pressure-molded or otherwise formed of gypsum or a suitable cement or aggregate. It will be apparent, however, that other materials may be used such as Portland cement, terra cotta, burned clay, metal, processed wood, or any other material which can be formed into block form by means of casting, casting and vibrating, pressure molding, or any other of the various methods of making building block which are well known to the art. It is preferable, however, that the material used should be of such a nature as to provide a unit capable of supporting a substantial load and capable of bonding effectively with conventional mortars.

Pressure molding is very desirable to provide increased density and moisture resistance. Also great strength may be obtained in a shell having comparatively thin walls, thus reducing the non-light-transmitting areas in the finished wall.

When it is desired to provide additional strength in the walls of the block, this may be obtained by using a suitable reinforcing means 4 such as expanded metal, which may be embedded in the walls of the block.

The material of which the shell is made may provide suitable moisture proof characteristics, that is, suitable waterproofing material may be mixed with the base material from which the block is formed so that, after the block is pressure-molded or otherwise suitably formed, the material thereof is inherently water and water vapor proof. Under some circumstances it is preferable to use the usual materials such as previously mentioned to form the shell and then treat or coat the entire inner and outer surfaces of the shell with suitable waterproofing material to prevent moisture and water vapor infiltration.

The light transmitting facings 3 may be se-

cured in position by suitable adhesive (Figs. 2 and 4) applied between the facings and the walls of the shell. This adhesive 5 is preferably a yieldable material such as an asphalt adhesive and therefore permits a differential contraction and expansion of the shell and facings in response to temperature changes.

In the embodiment illustrated in detail in Fig. 3, the outer surface of the shell may be provided with a moisture and water vapor proof coating 6 and the facings may be secured to the walls by means of a layer of adhesive 7 therebetween. This adhesive may be of material similar to the coating or of any suitable material, such as the adhesive 5, whereby the relative expansion and contraction of the parts may take place without injury to the blocks. The plaster between the blocks is shown at 8 in Fig. 4. The entire surface of the shell or any desired portions thereof, such as the inside surface, may be treated with other water and water vapor proofing materials such as asphalt, sulphur, sulphur-pitch, cold glazes, varnishes, and other materials whereby infiltration of moisture and water vapor into the hollow space within the block is prevented and the insulating characteristic of the dead air space is maintained.

A thin light-reflecting metallic foil or coating 9 may be applied to the inner surface of the shell as shown in Fig. 3. This provides some heat insulation and efficient moisture and water vapor proofing. The aluminum foil on the interior of the block has a marked tendency to increase the reflection of the light and therefore produces an optical illusion of an all glass section which approaches glass block in apparent characteristics. Such a coating may also be applied to the outer surface of the shell if desired. A suitable method of moisture and water vapor proofing the shell is to impregnate the building unit by immersion in the water and vapor proofing material either under pressure or vacuum. In any event it is desirable to water and vapor proof the unit sufficiently to prevent ingress of moisture to the interior, either at the facings or through the shell.

The facings 3 are preferably made of glass, although various transparent or translucent materials may be used, such as certain resins, gelatin films, etc., which are capable of withstanding varying atmospheric conditions. The facings may be decorated as desired, or may be of any suitable color, and if desired they may be reinforced with some material as wire mesh to give increased fire protection.

In securing the facings 3 to the block, it is desired to provide a suitable moisture and vapor proof seal and at the same time permit relative expansion and contraction of the elements of the unit. In order to accomplish this, the ends of the walls to which the facings are to be applied may be coated with suitable adhesive, preferably an asphalt adhesive, and the facings may be applied thereto by pressure. It is also desirable to protect the adhesive from the disintegrating effects of light rays. The engaging marginal portions of the facings may therefore be coated with some opaque materials such as aluminum paint or may have foil applied thereto to provide an opaque film 10 between the facing and the shell. This film 10 may provide a light reflecting surface adjacent the facing, if desired, to reduce the contrast between the center of the block and the shell walls as shown in Fig. 1.

It will be apparent that the construction just described will provide a load bearing and light

transmitting moisture proof block which will not be materially affected by temperature changes nor by any of the usual strains and stresses to which they are ordinarily subjected.

In Fig. 2 the shell 1a is elongated or may be made in any desired shape, and is provided with a central partition 11 to provide additional strength for the load supporting function of the block. The light transmitting facings 3a may cover the entire face of the block in the same manner as illustrated in Fig. 1.

Fig. 5 illustrates a somewhat different method of securing the facings to the shell. In this embodiment the walls of the shell are provided with channels 12 having a suitable plastic material 13 therein, and light transmitting facings 14 may be provided with inturned flanges 15. These flanges 15 are pressed into the plastic material as illustrated and are therefore retained in place and the joint between the facing and shell is effectively sealed. The plastic material 13 enables relative expansion and contraction of the block and facings.

Fig. 6 illustrates another embodiment of the invention in which facings 16 are provided with suitable holes 17 therethrough and the walls are provided with spaced expansion sockets 18, which are embedded therein. Screws or bolts 19 may be inserted through the holes in the facings and secured in the sockets 18. A suitable adhesive 20 is provided between the facings and the shell, and the facings may securely be clamped by means of the screws 19. This provides an effective moisture and water vapor proofing between the facings and the shell and the holes 17 permit relative expansion and contraction of the parts.

Fig. 7 illustrates still another method of securing the facings in a position to cover the open sides of the block. In this embodiment a metallic covering 21 preferably of sheet metal is provided for the shell 1 and this covering extends somewhat beyond the edges of the shell as shown and is provided with downwardly extending flanges 22 and 23. The flange 23 is formed after the facing is inserted by rolling or pressing the material of the covering downwardly over the edge of the facing from the dotted line position shown. A gasket 24 is provided between the flange 22 and the facing 3 and may be of any suitable material such as rubber, asbestos, or the like, properly impregnated to provide a moisture and vapor proof joint. The light transmitting blocks may be assembled in a wall in the manner illustrated in Fig. 4, in which they are secured together by means of the layer 8 or mortar between the units.

Figs. 8 and 9 illustrate an embodiment of the invention wherein the walls of the shell are formed to provide a depression or channel 25 between adjacent blocks and to enable the edges of the blocks to contact at 26 (Fig. 9). The depression provides a pocket to receive the mortar 27. The facings 3a are of slightly smaller dimensions than the block to prevent any portion of the load from the wall above from being transmitted to the facings themselves. After erection of the wall the joints between the facings may be pointed up as shown at 28 with neat Portland cement or other suitable plastic material. In this construction the visible mortar joint between the facings is reduced to a minimum and the wall presents a more nearly solid glass surface.

In Fig. 10 the walls of the shell are of a minimum thickness adjacent the facings, thus reducing to a minimum the non-light-transmitting

areas of the block. The wall may be curved inwardly, or otherwise formed in a manner to give the required thickness at the center for load bearing strength and at the same time provide a reflecting surface at 29 which will not be visible from the exterior of the block. The facings may be secured to the block in a suitable manner as previously described. In the embodiment shown, clips 30 are arranged to engage over the edge of the facing and are provided with inwardly extending portions secured in the shell. A layer of suitable yielding adhesive 32 may be used to seal the joint between the facing and shell.

It will be apparent that, with any of the embodiments herein illustrated and described, it is possible to easily remove and replace any individual facing of a block even after the block has been installed in a wall. This is very desirable in the event that repairs are required and also when it is desired to change the facings in order to vary the decorative features of the structure.

A wall constructed of units made in accordance with this invention enables light to be transmitted to the interior of the building and, in addition, the walls are load supporting and provide effective heat and sound insulation and are also moisture proof. The shell provides sufficient strength to maintain the load supporting characteristics of the wall even after the facings have become ineffective.

Modifications may be made without departing from the spirit of the invention, and it is therefore desired that the invention be limited only by the prior art and the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A hollow building block comprising a shell of molded material and having open sides, a light transmitting facing covering each open side, a layer of plastic adhesive between said facings and said shell walls, and an opaque coating secured to the inner marginal surface of said facings for preventing light transmission to said plastic adhesive.

2. A hollow building block comprising a shell of molded material and having open sides, a light transmitting facing covering each open side and substantially coextensive therewith, a layer of plastic adhesive between said facings and said walls, and a moisture and vapor proof coating on the outer surfaces of said shell, said coating overlapping the edges of said facings and having effective bonding characteristics with conventional mortar.

3. In a hollow building block of the character described, a cementitious shell, a light transmitting element covering an open side of said shell and means whereby the inner marginal surface of said element overlapping the walls of said shell will reflect light outwardly therefrom.

4. A hollow building block comprising a shell having open sides, the walls of said shell having channels therein, a plastic material in said channels, and light transmitting facings covering said open sides and having portions extending into said channels whereby said plastic material secures said facings to said shell and seals the joint therebetween.

5. A moisture and water vapor proof hollow building block comprising a shell having open sides and having an annular plaster receiving channel in the outer surface around said block between the open sides whereby the marginal

edges of adjacent blocks in a wall may be contiguous, and a comparatively thin, light transmitting facing covering each open side and of smaller dimensions than the adjacent open sides of said shell to provide a narrow pointing groove between the edges of the facings of adjacent blocks.

6. A hollow building block comprising a shell having open sides and having its outer surface arranged to form a plaster pocket between adjacent blocks in a wall with the outer edges of said outer surfaces substantially in load supporting contact, and a glass plate covering each open side and of smaller dimensions than said block to provide a narrow groove between the edges of the facings of adjacent contacting blocks.

7. A light transmitting hollow building block comprising a molded opaque shell having open sides, light transmitting facings covering said open sides and substantially coextensive therewith, the inner surface of the walls of said shell being substantially convex to provide a thick intermediate load bearing portion, and being materially thinner adjacent the facings whereby the non-light-transmitting area of the block is reduced to a minimum, and a reinforcing web embedded in said walls and extending closely adjacent the edges thereof to reinforce the thin portions of the walls.

8. A light transmitting hollow building block comprising a molded opaque shell having open sides, light transmitting facings covering said open sides, the walls of said shell in cross section having a thick intermediate load bearing portion, and being materially thinner adjacent the facings whereby the non-light-transmitting area of the block is reduced to a minimum, the shell having a light reflecting inner surface, and means whereby the inner marginal surface of said facings overlapping said walls will reflect light outwardly therefrom.

9. In a block of the character described comprising a molded hollow shell having open sides and glass plates covering said open sides, means for securing said plates, said means comprising a socket secured into said shell, means extending through an opening in said plate and engaging in said socket, said opening being of a size to permit relative movement of adjacent surfaces due to temperature changes, and a yielding adhesive between said plates and said shell.

10. A hollow building unit comprising a load supporting and moisture and water vapor proof integral shell having open sides, a light transmitting facing attached to each open side of said shell, a moisture and water vapor proof seal between said facing and said shell, and means for securing said facing, said securing means comprising clips molded into said shell and engaging the edges of said facing.

11. A hollow building block comprising a load supporting shell of preformed material having open sides, a light pervious facing covering each open side and overlapping the walls of said shell, a layer of plastic adhesive between said facings and said shell, and an opaque coating secured to the inner marginal surface of said facings and substantially coextensive with said adhesive, said coating having a light reflecting surface adjacent said facings.

12. A hollow building block comprising a load supporting shell of molded material having open sides, a light pervious facing secured to and covering each open side of said block and substantially coextensive therewith, and a thin layer of

material between the walls of said block and the inner marginal surfaces of said facings and coextensive with the wall surfaces covered by said facings, the outer surface of said layer being light reflecting.

13. A hollow building block comprising a load supporting shell of molded material having open sides, a light pervious facing secured to and covering each open side of said block and substantially coextensive therewith, and a thin layer of material between the walls of said block and the inner marginal surfaces of said facings and coextensive with the wall surfaces covered by said facings, the entire inner surface of said block and the outer surface of said layer being light reflecting.

14. A hollow building block comprising a load supporting shell of molded material having open sides, a light pervious facing secured to and covering each open side and overlapping the walls thereof and substantially coextensive therewith, a layer of light reflecting material between said walls and said facings, and a layer of light reflecting material covering the inner surface of said shell.

15. A hollow building block comprising a shell of molded material, said shell having open sides and the walls thereof being of sufficient thickness to provide a self-supporting wall when the blocks are assembled, said shell having an outer surface characterized by its porosity and suction whereby it has effective bonding characteristics with conventional cementitious mortars, said shell having its inner surfaces rendered substantially impermeable to moisture and water vapor, light-transmitting facings covering the open sides of said shell, means for securing said facings to said shell, and means for providing a substantially moisture and water vapor impermeable joint between said facing and said shell.

16. A hollow building block comprising a shell of molded material and having open sides, a light-transmitting facing covering each open side,

means for securing said facings to said shell, and a highly light-reflecting metallic film on the inner walls of the shell, whereby the opaque side walls are not as visible through the glass facings and an illusion is thus given of an all-glass block.

17. A hollow building block comprising a shell of molded material and having open sides, a light-transmitting facing covering each open side, means for securing said facings to said shell, and a highly light-reflecting metallic and substantially vapor and moisture impermeable film on the inner walls of the shell, whereby the opaque side walls are not as visible through the glass facings and an illusion is thus given of an all-glass block.

18. A hollow building block comprising a shell of molded material and having open sides, said shell having walls sufficiently thick to form a self-supporting wall when assembled, light-transmitting facings covering the open sides, the facings being supported a distance away from the edge surfaces of the shell by means of relatively thin supporting means, whereby the opaque shell edges are not readily discernible through the glass facings.

19. A hollow building block comprising a shell composed of cement molded under pressure, said shell having open sides and the walls thereof being of sufficient thickness to provide a self-supporting wall when the blocks are assembled, the outer cement surface of said shell retaining its porosity and suction so that it has effective bonding characteristics with conventional cementitious mortars, said shell having its inner surfaces rendered substantially impermeable to moisture and water vapor, light-transmitting facings covering the open sides of said shell, means for securing said facings to said shell, and means for providing a substantially moisture and vapor impermeable joint between said facings and said shell.

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