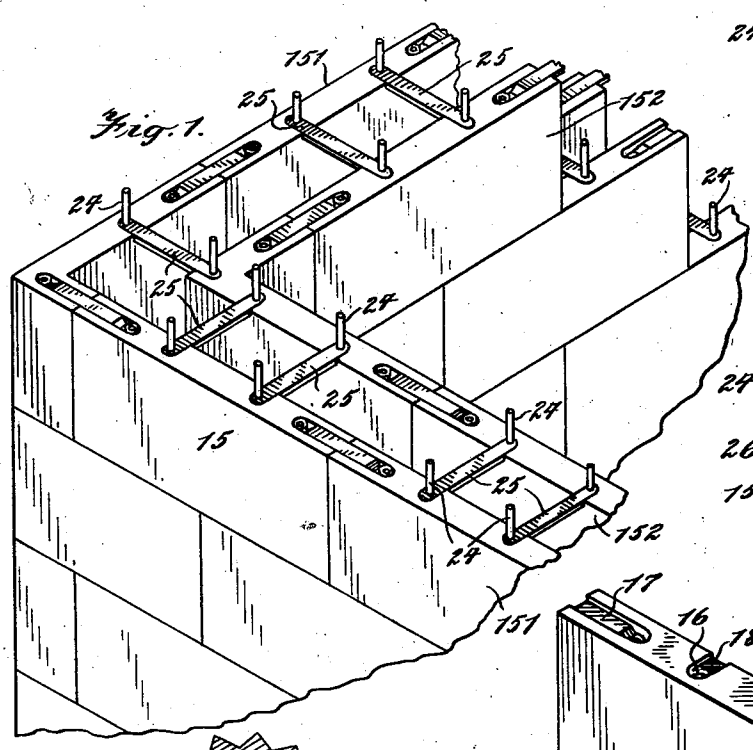
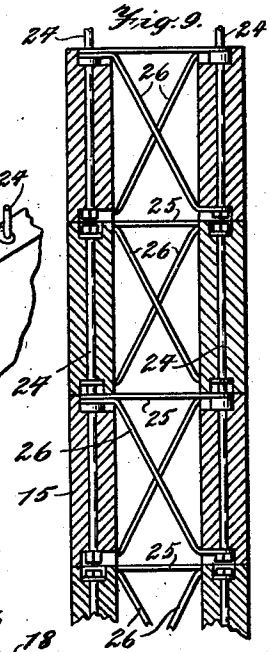
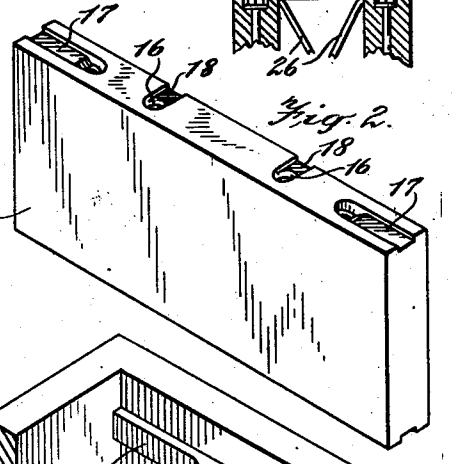
April 8, 1930. J. E. TONNELIER 1,753,451

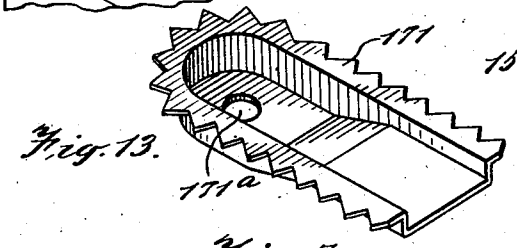
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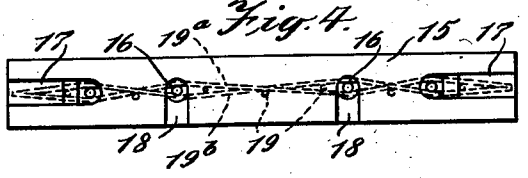
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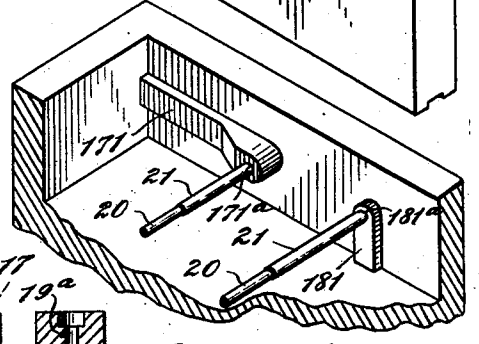


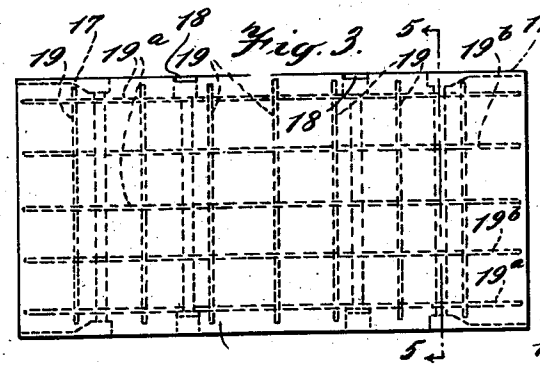












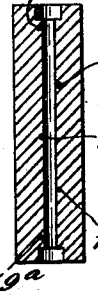


Fig. 12.

Fig. 5.

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Fig. 6.

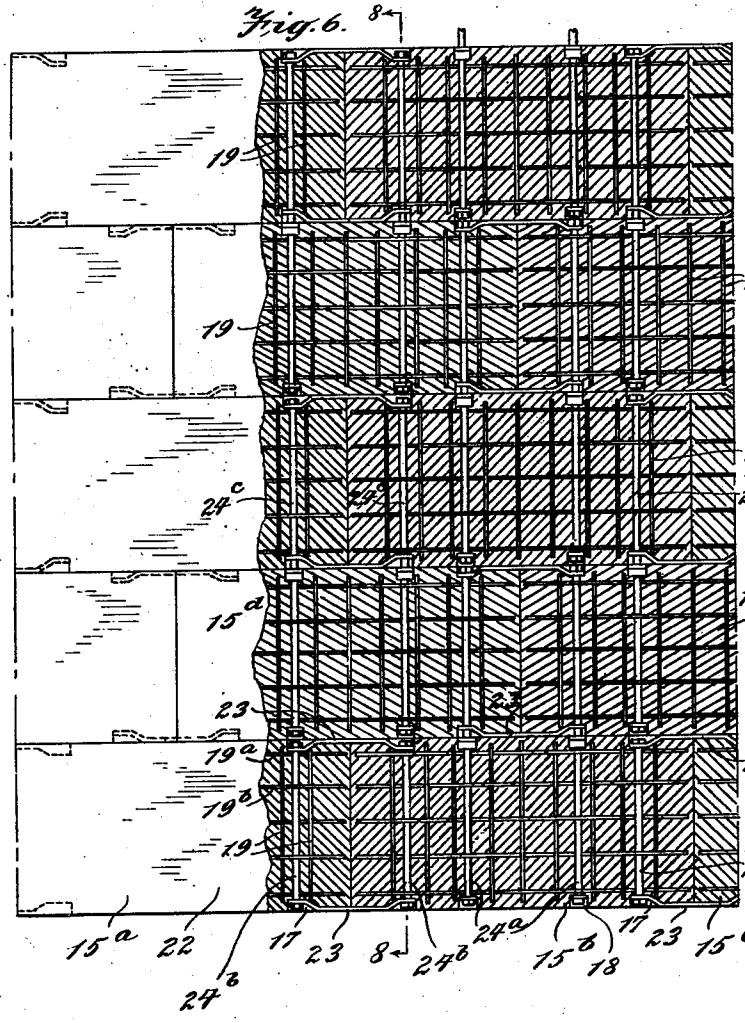


Fig. 8.

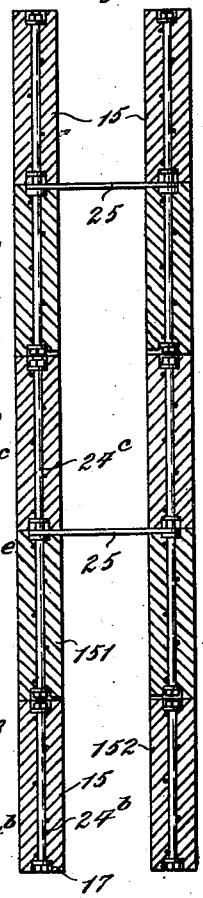
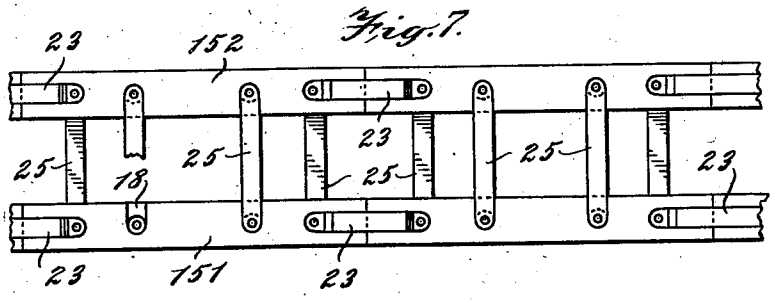


Fig. 7.



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Fig. 10.

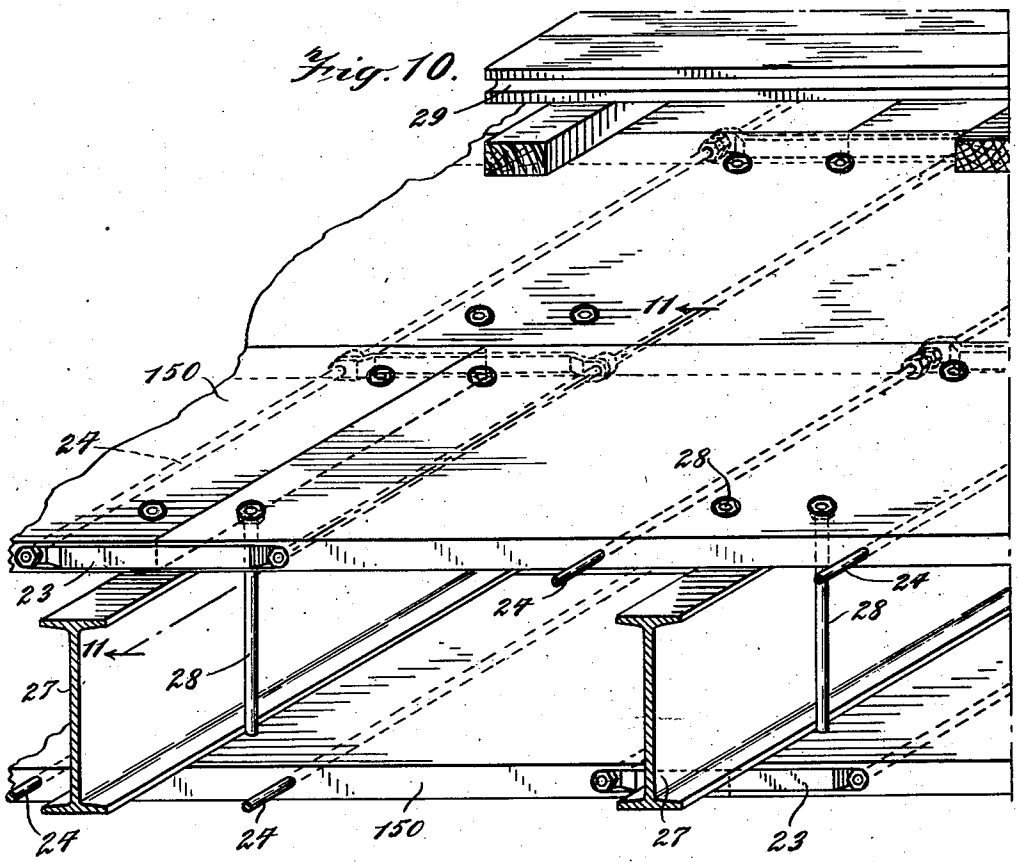
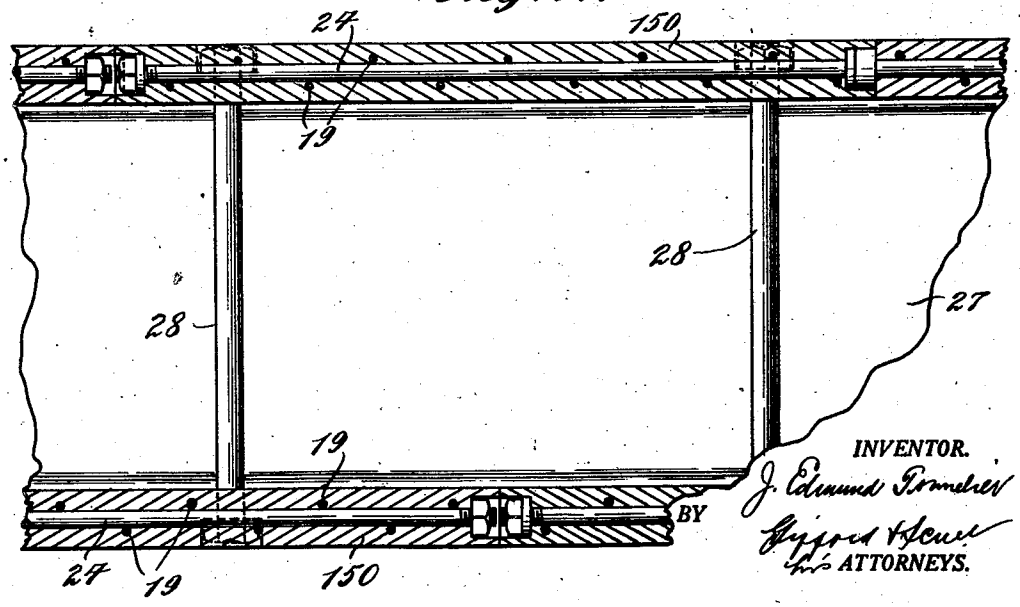


Fig. 11.



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UNITED STATES PATENT OFFICE

JOHN EDMUND TONNELIER, OF NEW YORK, N. Y.

WALL

Application filed July 27, 1927. Serial No. 208,747.

My invention is particularly applicable in connection with building structures, although, of course, it will be understood that it is not limited thereto.

My invention will best be understood by reference to the accompanying drawings, in which I have illustrated a preferred embodiment of my invention, and in which Fig 1 is a fragmentary perspective view illustrating a wall embodying my invention; Fig. 2 is a perspective view of one of the blocks of Fig. 1; Fig. 3 is a side view and Fig. 4 is a plan view of Fig. 3; Fig. 5 is a section taken on the plane of the line 5—5 of Fig. 3; Fig. 6 is a side view, partially in section, of a wall embodying my invention; Fig. 7 is a plan view of Fig. 6; Fig. 8 is a vertical section taken on the plane of the line 8—8 of Fig. 6; Fig. 9 is a section similar to Fig. 8, but illustrating a modification; Fig. 10 is a perspective view taken in section, illustrating my invention applied to floor construction; Fig. 11 is a section taken on the plane of the line 11—11 of Fig 10; Fig. 12 is a fragmentary perspective view illustrating a portion of a mold for forming one of the blocks, and Fig. 13 is a perspective view illustrating a metallic form for producing in the finished block a recess of the desired shape.

Like reference characters indicate like parts throughout the drawings.

Referring now to the drawings, 15 indicates one of the blocks of hardened plastic material which is utilized in building the wall construction embodying my invention, and generally of the form illustrated in Fig. 2. Each block is preferably provided with a plurality of holes 16, preferably extending substantially parallel to the face of the block as it is laid in the wall, and also substantially parallel to the ends of the block. In the embodiment of my invention illustrated, each block is provided with four holes, two of which are adapted to register with the holes of a given block of an adjacent row, and the other two holes of which are adapted to register with two holes of adjacent blocks of an adjacent row.

Each block is also preferably provided on both its upper and lower sides, and at the ends thereof, with recesses 17 extending from the outer two holes of the block to the ends thereof, as best shown in Fig. 2. Each block is also preferably provided on its upper and lower sides with recesses 18 extending from the middle holes of the block to a side thereof, and is also preferably provided with metallic reinforcing members, which, in the embodiment of my invention illustrated, is in the form of wire mesh 19 of well known form.

The block of hardened plastic material is preferably molded or cast into the required form and shape in a prepared mold in the following manner:

Suitable metallic cores or bolts 20 are secured within the mold in a position to form the hole 16 in the finished block. The bolts are preferably slightly tapered throughout their length, and covered with waxed paper as illustrated at 21, in order to permit the ready removal of the bolts from the cast blocks.

Suitable metallic forms to shape the recesses 17 and 18, which are to be produced in the blocks, are also secured in position in the mold, the upper edges of the forms that are to be in the top of the block engaging the top of the mold, and the bottom edge of the forms in the bottom of the block engaging the bottom of the mold, thereby preventing the plastic hardened material flowing into the recesses 17 and 18, respectively. These forms, which are indicated at 171 and 181, are preferably perforated as at 171[a] and 181[a], and, in the form illustrated, become a part of the block.

The reinforcing members are then placed in position in the mold, and when the reinforcement consists of wire mesh such as illustrated, alternate wires in the mesh which are

at right angles to the holes 16 and only such of the wires as come opposite said holes in the finished product, are drawn away from the plane of the mesh, alternate wires being drawn from the plane of the mesh in opposite directions as illustrated in Figs. 4 and 5, and as shown at 19^a and 19^b. The wires of the mesh, therefore, surround the hole, thereby imparting additional strength to the finished block. In accordance with my invention, the blocks of plastic material are preferably coated with an adhesive waterproofing material, such as bitumen material, or the like. When the blocks are so coated, the waterproofing material is preferably applied to the block on all faces except one side face after the block has been thoroughly dried.

After the mold has been filled with the self-hardening plastic material, and after the material has hardened to form a block, it is removed from the mold, and the cores or bolts 20 are then removed from the block, the waxed paper permitting ready removal.

A wall embodying my invention may consist either of a single wall or of spaced walls, as illustrated in Fig. 1. In laying a single wall, the workman merely lays up one row after another of the blocks with the adhesive material which has been applied to all of the faces of the block except one, taking care that the joints between successive rows overlap. In laying up the wall, adjacent rows are bound together by metallic members, such as bolts, as best shown in Figs. 6 and 8.

The construction of the wall will be understood by a consideration of how three blocks in the lowermost row and two blocks in the next upper row are laid. Consider the lowermost row indicated at 22 in Fig. 6. Beginning with blocks 15^a, 15^b, and 15^c, the workman would first place metallic binding strips 23 within the recesses 17 in the blocks mentioned and place in the holes 16, bolts 24^b which are located in the holes at the ends of the blocks and which extend through one block, the lower ends of the metallic members or bolts being received in the perforated ends of strips 23. The bolts 24^a, which are illustrated in connection with block 15^b, are also inserted and project upward the width of the blocks of the next upper row. Metallic binding strips 23 are then placed in recesses in the upper faces between bolts 24^b, engaging and fastened by these bolts. Metallic binding strips 23 are also placed over projecting ends of bolts 24^a in such a manner that they will engage the recesses in the blocks of the row next above. After having been fitted in their middle holes with bolts 24^c projecting upward the width of the blocks of the next upper row, blocks 15^d and 15^e are placed upon blocks 15^a, 15^b and 15^c, with the end openings in blocks 15^d and 15^e engaging the projecting ends of bolts 24^a. Metallic binding strips 23 are then placed in recesses in the upper faces of blocks 15^d and 15^e between bolts 24^a, engaging the ends of these bolts and being fastened by them. Metal binding strips 23 are also placed over the projecting ends of bolts 24^c in preparation for the next row of blocks above. It will be understood that the entire wall may be built in the foregoing manner or by completing one row before applying the next.

In case the wall construction comprises two spaced walls 151 and 152, as illustrated in the drawings, then as the blocks are laid up, perforated metallic binding pieces 25 are placed over the bolts in the middle of the block as illustrated in Fig. 1, the joints between the blocks preferably coming opposite each other in the two walls, as illustrated in Fig. 1, the binding strips 25 serving to maintain the two walls 151 and 152 in spaced relation.

It will, of course, be understood that the space between the two walls may be filled with self-hardening plastic material, if desired; or this space may be filled with some insulating material or material of low heat conductivity.

In case further strengthening of the spaced walls is required, this may be secured by diagonal metallic members perforated at their ends 26, the ends of which are preferably bent, as illustrated in Fig. 9, and are placed over the bolts 24.

In Figs. 10 and 11, I have illustrated my invention applied to a floor construction comprising blocks 150 located above and below structural I-beams 27, respectively, the blocks being formed in substantially the same manner as one of the single walls shown in Fig. 1, and a detailed description need not, therefore, be repeated. The floor construction above and below the I-beams are preferably clamped in position by bolts or other metallic members 28. A wooden floor construction is illustrated at 29, laid upon the upper portion of the floor construction embodying my invention, and comprising the blocks of hardened plastic material.

It is to be understood, therefore, that while the wall embodying my invention is particularly applicable to a vertical wall, such as shown in Fig. 1, it is not limited thereto, and the term "wall" as used in the claims is intended to cover structural combinations which lie in any plane and which may or may not satisfy the true definition of a "wall."

It will be apparent to those skilled in the art that numerous advantages, both structural and commercial, result from a construction embodying my invention.

The construction provides a wall of maximum strength with minimum use of materials which may be designed to meet exact strength requirements with the materials stressed to the highest safe working values.

The wall is also capable of resisting predetermined tensile stresses, and has, by virtue of its ability to resist both tensile and compressive stresses, considerable strength as a beam. While possessing the foregoing qualities, it provides a construction made up largely of duplicate parts that may be prepared, in advance of construction, at a central point with machinery and equipment designed to give the greatest relative speed of production and consequent maximum economy.

In actual construction, material is provided by my invention which may be completely prepared beforehand, delivered ready for assembly and assembled without preparation of additional materials at the point of assembly. It also provides a material that requires for assembly the very simplest of operations and that may be prepared in units of size that can be most readily handled and assembled in maximum quantity for a given expenditure of labor.

It will, of course, be understood that the space between the two walls constructed in accordance with my invention may be filled with any suitable material. For example, where a solid wall is desired, the space between the two walls may be filled with self-hardening plastic material, thereby making a solid wall, and this result is accomplished without the use of forms. Again, the space may be filled with any suitable non-conducting material, such as mineral wool, that will serve to increase the insulating value of the wall. Furthermore, the space between the two walls may be filled with any loose material, such as cinders, that will serve to retard air circulation and thereby increase the heat insulating value of the wall.

In the preferred embodiment of my invention illustrated in the accompanying drawings, each of the blocks is provided with four holes extending vertically therethrough. Two rods extend through the two center holes of each block and are of sufficient length to extend through the next tier of blocks. Over each of these rods is placed a perforated metallic member. Two other blocks are superimposed above the first blocks and located side by side with their ends touching, so that the rods projecting from the lower block pass through an end hole of each of the superimposed blocks. A perforated metallic member is placed over the ends of the two rods across the joint of the superimposed blocks, and the rods are secured in position and drawn tightly in tension. By this arrangement, the two superimposed blocks are joined to the two lower blocks in such a manner that they will form a stable wall independently of and without the use of cementitious material. Furthermore, this operation joins together the two superimposed blocks laterally without the aid of cementitious material; that is to say, a given block is secured to the adjacent block of a given row by means independent of cementitious material and the arrangement of the metallic parts is such that the blocks are capable of resisting lateral tensile stress through the imbedded metallic member surrounding the rods, the perforated members engaging the rods across the joints and the rods themselves. It will be further noted that the construction becomes stable immediately upon completion of a very simple operation.

When applied to two or more spaced walls, as in the embodiment illustrated, the metallic members are applied and fastened in place by the same operation that joins the blocks of each wall, that each part added to the wall is made a stable part of the wall by simple operations and as the building of the wall progresses, and that the spaced walls are made into a complete and stable unit as their construction progresses and to the point to which their construction has progressed. Moreover, any two adjoining blocks are joined through their end holes to the next block beneath through the central holes of the latter and are joined to the next blocks above through their central holes and the end holes of the superimposed blocks. The tie rods or other connecting members are thus in tension and are staggered between each two rows of blocks. The effect is to provide complete tensile connection throughout the height of the wall without continuous tension members or members spliced into a continuous member at each lateral joint of the wall. The blocks themselves form the splice by their strength as beams, their shearing strength and their compressive strength. It may be added that maximum tensile strength both laterally and vertically is a highly desirable feature if walls are to be constructed of materials in minimum quantity.

In general, a wall formed in accordance with my invention provides a construction that is fire-resisting, sound-resisting, vermin-proof and that will not sweat as do many other types of walls.

I claim:

1. A wall construction comprising two spaced walls each comprising a plurality of rows of blocks of hardened plastic material, the joints between the blocks of one row being staggered with respect to those of an adjacent row, each block being provided with holes extending substantially parallel to the face of said wall and to the ends of the blocks, the holes of a block of a given row being adapted to register with holes in the blocks of adjacent rows, first metallic members adapted to pass through the holes of adjacent rows, second perforated metallic members overlapping the joints between adjacent blocks of a given row and engaging said first metallic members, and third perforated metallic members extending between said spaced walls and en-

gaging at their ends said first metallic members extending through the holes in the blocks located in the respective adjacent walls, binding together the respective blocks and rows of blocks in adjacent walls and the adjacent walls to each other.

2. A wall construction comprising two spaced walls each comprising a plurality of rows of blocks of hardened plastic material, the faces of each block in said spaced walls except one only being coated with adhesive waterproofing material, the joints between the blocks of one row being staggered with respect to those of an adjacent row, each block being provided with holes extending substantially parallel to the face of said wall and to the ends of the blocks, the holes in a block of a given row being adapted to register with the holes in the blocks of adjacent rows, first metallic members adapted to pass through the holes of adjacent rows, said blocks being provided in the faces with depressions extending from said holes to an adjacent face of said block, second perforated metallic members inserted in said depressions overlapping the joints between adjacent blocks of a given row and engaging the first metallic members, and third perforated metallic members extending between said spaced walls and inserted in depressions in the faces of said blocks and engaging the said first metallic members, thereby binding together the adjacent blocks and rows of blocks in adjacent walls and the adjacent walls to each other and sealing the joints and one face of each of said walls with waterproofing material.

3. A wall comprising blocks of hardened plastic material each provided with holes extending entirely through each block and substantially parallel to the side faces and to the ends of the blocks, metallic tension members extending through holes of a given block and those of a next higher block, metallic members extending longitudinally of said blocks, a given metallic member extending on opposite sides of adjacent holes of said blocks, and alternate metallic members extending on opposite sides of a given hole whereby said metallic members surround metallic tension members inserted in the holes of said blocks.

4. A wall comprising blocks of hardened plastic material each provided with holes extending entirely through each block and substantially parallel to the side faces and to the ends of the blocks, metallic tension members extending through holes of a given block and those of a next higher block, metallic reinforcing members extending longitudinally and vertically of said blocks, a given longitudinal metallic member extending on opposite sides of adjacent holes of said blocks, and alternate longitudinal metallic members extending on opposite sides of a given hole whereby said metallic members surround metallic tension members inserted in the holes of said blocks.

5. A wall comprising blocks of hardened plastic material each provided with holes extending entirely through each block and substantially parallel to the side faces and to the ends of the blocks, metallic reinforcing members extending longitudinally and vertically of said blocks, metallic members extending through holes of a given block and those of a next higher block, a given longitudinal metallic member extending on opposite sides of adjacent holes of said blocks, and alternate longitudinal metallic members extending on opposite sides of a given hole whereby said metallic members surround other metallic members inserted in the holes of said blocks, holes of blocks in adjacent rows registering with each other, and metallic tension members extending through the holes of a plurality of vertically disposed blocks and tying said blocks together without the aid of cementitious material.

6. A wall comprising blocks of hardened plastic material each provided with holes extending entirely through each block and substantially parallel to the side faces and to the ends of the blocks, metallic members extending through holes of a given block and those of a next higher block, metallic reinforcing members extending longitudinally of said blocks, other metallic reinforcing members extending vertically of said blocks, the longitudinal and vertical metallic reinforcing members being attached together at their points of intersection, a given longitudinal metallic member extending on opposite sides of adjacent holes of said blocks, alternate longitudinal metallic members extending on opposite sides of a given hole whereby said metallic members surround other metallic members inserted in holes of said blocks, holes of blocks in adjacent rows registering with each other, and metallic tension members extending through the holes of a plurality of vertically disposed blocks and tying said blocks together without the aid of cementitious material.

7. A wall comprising blocks of hardened plastic material coated on its outer face and on at least some of its sides forming joints with adjacent blocks with an adhesive waterproofing material, and metallic tie members in tension securing blocks in one row to blocks in an adjacent row whereby the pressure of the metallic ties in tension heals as one the adhesive waterproofing material on contiguous surfaces of adjacent blocks.

8. In combination, a wall formed of blocks of hardened plastic material arranged in rows, the joints between the blocks of one row being staggered with respect to the corresponding joints of an adjacent row, each block being provided with holes extending entirely through each block and substantially

parallel to the face of the wall and to the ends of the blocks, the holes of a given block being adapted to register with those of the blocks of an adjacent row, perforated metallic members placed in the joint plane and adapted to overlap the joints between adjacent blocks of a given row and surround adjacent holes in said blocks, and metallic tension members adapted to pass through the holes in the blocks of adjacent rows and through said perforated metallic members thereby securing the adjacent blocks together in two directions without the aid of cementitious material.

9. In combination, a wall formed of blocks of hardened plastic material arranged in rows, the faces of each block of said wall except one only being coated with bituminous or other waterproofing material, the joints between blocks of one row being staggered with respect to the corresponding joints of an adjoining row, each block being provided with holes extending entirely through each block and substantially parallel to the face of the wall and to the ends of the blocks, the holes of a given block being adapted to register with those of the blocks of adjacent rows, perforated metallic members adapted to overlap the joints between adjacent blocks of a given row and the adjoining holes of adjacent blocks, and bolts or other metallic tension members adapted to pass through the holes in the blocks of adjacent rows and through said perforated metallic members thereby securing the adjacent blocks together without the aid of cementitious material.

10. A wall construction comprising two spaced walls each of which comprises a plurality of rows of blocks of hardened plastic material, the joints between blocks of one row being staggered with respect to those of an adjacent row, metallic tension members joining blocks in adjacent vertical rows together without the aid of cementitious material, metallic members overlapping the joints between adjacent blocks of a given row and said metallic tension members for tying said adjacent blocks together without the aid of cementitious material, metallic members extending between said spaced walls and engaging said metallic tension members in spaced walls whereby said metallic members are joined to said spaced walls without the aid of cementitious material, the intervening space between said spaced walls being filled with material of low heat conductivity.

11. A wall construction comprising two spaced walls each of which comprises a plurality of rows of blocks of hardened plastic material, the joints between blocks of one row being staggered with respect to those of an adjacent row, metallic tension members joining blocks in adjacent vertical rows together without the aid of cementitious material, metallic members overlapping the joints between adjacent blocks of a given row and said metallic tension members for tying said adjacent blocks together without the aid of cementitious material, and metallic members extending between said spaced walls and engaging said metallic tension members in spaced walls whereby said metallic members are joined to said spaced walls without the aid of cementitious material, the intervening space between said spaced walls being filled with hardened plastic material.

12. A wall comprising a plurality of rows of blocks of hardened plastic material with imbedded metallic members, each of said blocks being provided with holes extending entirely through said blocks and parallel to the sides and ends of said blocks and registering with holes in adjacent blocks, and metallic members passing through the holes of the blocks of a plurality of rows less in number than the rows of the entire wall, said metallic members being staggered with reference to each other, thereby securing the blocks of one row to the blocks of an adjacent row independent of and without the use of cementitious material in the joints.

13. A wall construction comprising two spaced walls each of which comprises a plurality of rows of blocks of hardened plastic material, and means for securing the blocks of a given row to blocks of an adjacent row by means independent of and without the use of cementitious material within the joints, in combination with means connected to said first-named means for maintaining the two walls in spaced relation.

14. A wall comprising a plurality of rows of blocks of hardened plastic material, each of said blocks being provided with holes extending entirely through said blocks and substantially parallel to the sides and ends of said blocks, the holes of a given row registering with holes of blocks in an adjacent row, metallic members passing through said holes for securing the blocks of a given row to the blocks of an adjacent row, and means independent of and without the use of cementitious material within the joints for securing a block of a given row to a block of an adjacent row and to an adjacent block.

15. A block of hardened plastic material provided with holes extending entirely through said block and substantially parallel to the side faces and to the ends of the block and which are adapted to receive metallic tension members, metallic members extending longitudinally of said block, a given metallic member extending on opposite sides of adjacent holes of said block, and alternate metallic members extending on opposite sides of a given hole whereby said metallic members surround the metallic tension members which are received in said holes.

16. A block of hardened plastic material provided with holes extending entirely

through said block and substantially parallel to the side faces and to the ends of the block and which are adapted to receive metallic reinforcing members extending longitudinally and vertically of said block, a given longitudinal metallic member extending on opposite sides of adjacent holes of said block, and alternate longitudinal metallic members extending on opposite sides of a given hole whereby said metallic members surround metallic members inserted in the holes of said block.

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