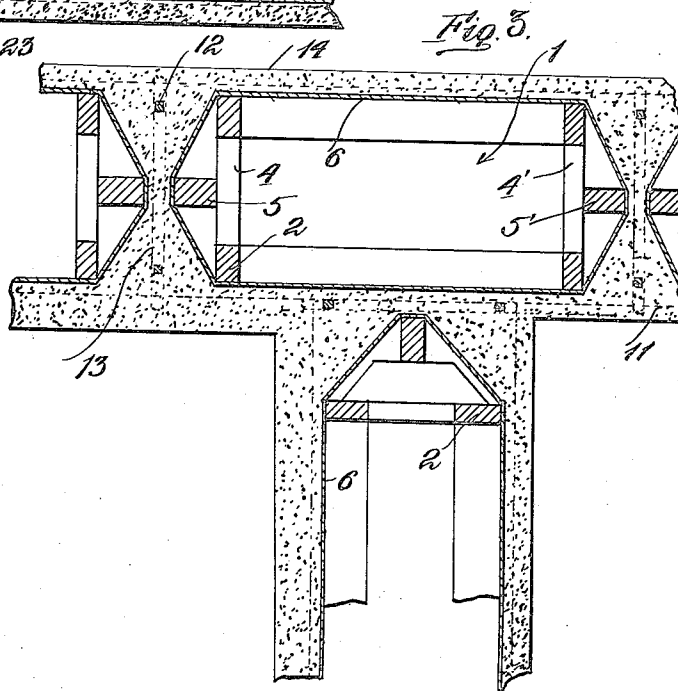
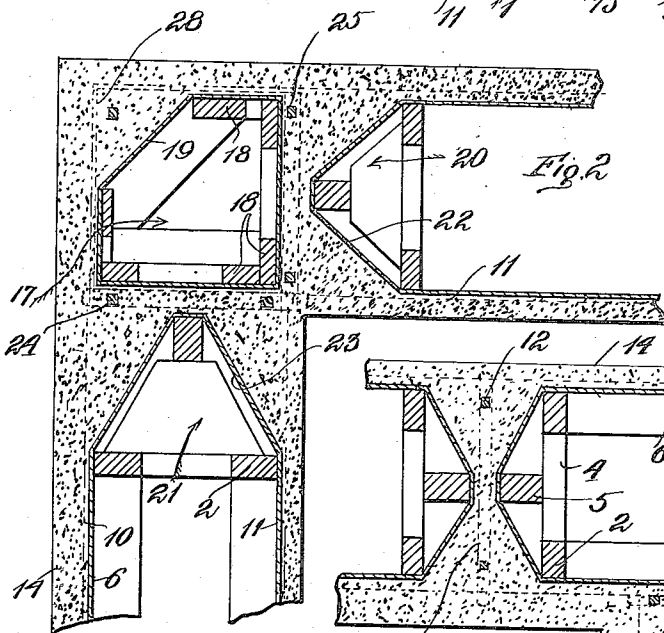
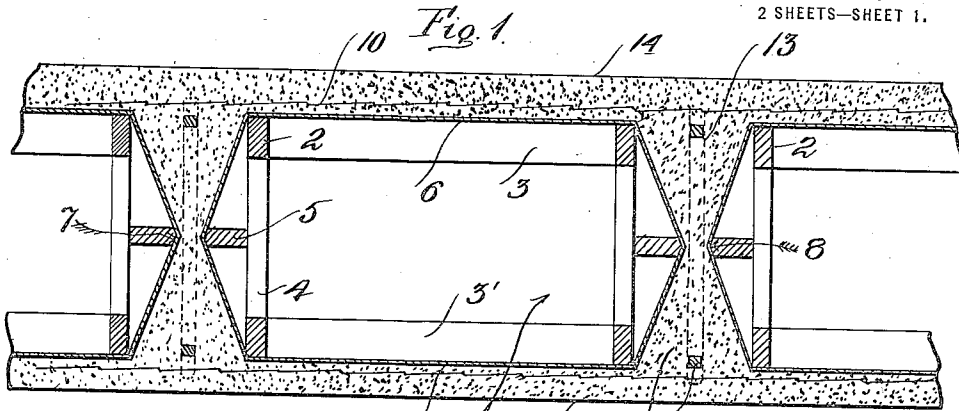


J. C. HAIN.
 BUILDING WALL.
 APPLICATION FILED NOV. 4, 1919.

1,433,005.

Patented Oct. 24, 1922.

2 SHEETS—SHEET 1.



Inventor:
 James C. Hain
 by *[Signature]*

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Fig. 4.

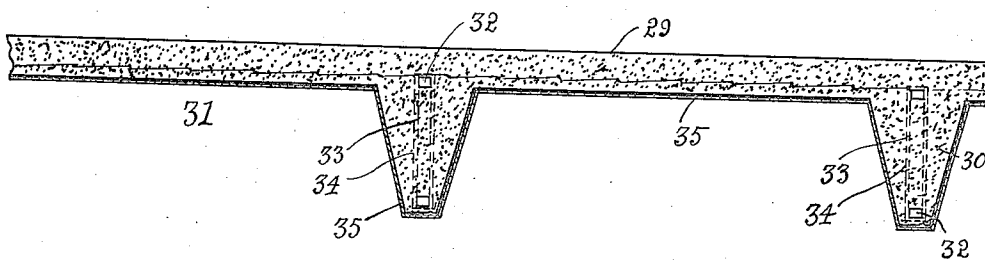
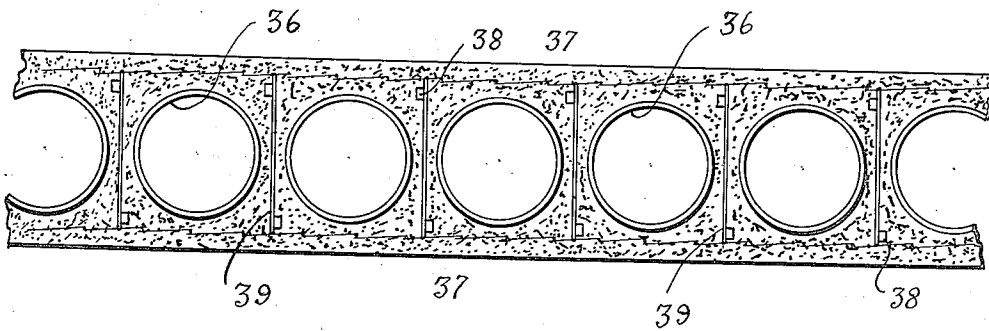


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES C. HAIN, OF LOS ANGELES, CALIFORNIA.

BUILDING WALL.

Application filed November 4, 1919. Serial No. 335,762.

To all whom it may concern:

Be it known that I, JAMES C. HAIN, a citizen of the United States, residing at Los Angeles, county of Los Angeles, and State of California, have invented a certain new and useful Building Wall, of which the following is a specification.

My invention pertains to a building or other construction and relates especially to a method of building walls, floors, partitions and other structural units from plastic material, an object of this invention being to provide a novel method of constructing building units, either separately or as composite elements of a structure, with integral member or studding, without employing outside forms, and to accomplish the formation of structural units with the least expense of labor, material and time, and in obviation of the unsatisfactory method of pouring the cementitious mass between and around the forms and the reinforcing.

A further object of my invention is to provide a method of producing, forming or constructing such units, as walls, floors, partitions and others, that are proof against excessive vibrations and shocks, such as earthquakes, also proof against sound transmission, and moisture and acting as a heat insulator; and furthermore to provide a method whereby walls, partitions and other structural elements may be made light and strong, with a considerable reduction in thickness, as compared with what the present methods are capable of producing, and are reinforced at the most effective points.

The method generally consists in constructing a wall or other building units by applying a plastic material under pressure to a background on which may be a suitable reinforcement.

I have used the term "background" throughout the specifications for want of a better, and as designatory of any setting on which a thickness of material may be laid.

Specifically my invention consists in applying cementitious materials under pressure to a setting, of predesigned form, which constitutes only a background for the cementitious material, and this method of constructing walls, partitions and other units, will be more readily understood, by referring to the completed units, shown in the accompanying drawings, and illustrative of my invention.

Fig. 1 represents a transverse section of a wall built according to my method.

Fig. 2 is a similar view of a corner of two adjoining walls;

Fig. 3 is a similar view of a wall with another wall at right angles to and joined intermediate the length of the first named wall.

Fig. 4 is a transverse section of a wall unit having but one face, with integral uniting or stud members; and

Fig. 5 is a sectional view illustrating a construction, according to my method, adaptable for ship walls or other floating structures.

Similar reference characters denote similar parts throughout the several figures.

In carrying my method of constructing units into practice, particularly with reference to Figs. 1, 2, and 3, a plurality of inside backgrounds which form the hollow spaces in the walls, presently described in detail, are set up, with a pre-determined space between each background, suitably supported in vertical position by any suitable means.

Each background may comprise a substantially rectangular hollow body 1, the frame of which may consist of a plurality of wooden or other uprights 2, held spaced longitudinally and transversely by members 3 and 3', and 4 and 4', respectively. Secured to the outside and centrally of the members 4 and 4', of each background may be uprights 5 and 5' respectively. The background, thus formed, is then covered with a suitable flexible or semi-flexible material 6, such as paper, textile fabrics, metal and the like.

If desired, these hollow backgrounds may be constructed entirely of metal or other material, and may be self supporting, economy and strength being the chief points of consideration.

This construction of a background is simple and far less expensive than forms now required for solid concrete walls, which necessitate rigid and substantial outer and inner units, constituting an integral form.

In the formation of hollow building units, according to present practice, the preparation of, and the material used in, the necessary forms, involves even a higher cost than that connected with solid concrete construction and the forms required therefor.

As is obvious from this disclosure, the present invention enables the lightest form of background to be used, and eliminates entirely the outside forms.

5 As seen in Fig. 1, the frame body or background thus constructed, may be substantially rectangular in form, with the exception of the diametrically opposed ends, which by reason of the members 5 and 5¹, respectively, may assume substantially the form or
10 outline of a regular triangle, whose apexes 7 and 8, respectively, may be in line with the longitudinal axes of the bodies, though in the form shown in Figs. 1, 2, and 3, it is
15 preferable to have the centers of the adjoining ends of the two backgrounds in close proximity, and obviously the backgrounds may be other than a substantially rectangular form, the drawing being merely illustrative of the idea.

20 The two ends of adjoining backgrounds may form the outline of the cement studding 9, that constitutes an integral element of the wall or other unit as presently described.

25 These backgrounds are set up substantially in the manner shown, with predetermined distances left between each two adjoining backgrounds for the formation of the cement studding or member. On the
30 outside and inside of the background, that is to say, on the front and rear faces of such backgrounds thus set up, suitable reinforcements 10 and 11, respectively, may be
35 placed and held by any means in proper relation to the backgrounds or their parts, in order that the reinforcements may be entirely embedded in the cementitious material which is blown on.

40 Owing to the impracticability of using a small mesh reinforcement in building a wall by the old method of pouring, the concrete or other mass cannot be made to surround the reinforcement on account of the large
45 stone particles and the difficulty of tamping. For that reason reinforces of large and coarse meshes are used. A small mesh, however, is advantageous, because it takes care of the shrinkage cracks to much better
50 advantage. The system of blowing in the particles, makes a dense product and excludes moisture, thus preserving the reinforcement. Hence only a small amount of cement mortar is required to cover the reinforcement.

55 In the spaces between the adjoining backgrounds, may preferably be placed a plurality of upright reinforcing bars or rods 12, that are tied together and to the reinforcements 10 and 11, by any suitable means, as tie wires 13, the rods and tie wire serving to reinforce the studding.

When the backgrounds are assembled in the manner substantially as shown in the
65 various figures of the drawings, cementiti-

ous material under pressure is applied to both faces of the aligned backgrounds. The application of the cementitious material continues until a front wall 14 and a rear or inside wall 15, of sufficient or desired thickness
70 is built.

In Fig. 2, I have illustrated a unit embodying a corner, and built in like fashion as mentioned heretofore.

The frame 17, for the corner may be made
75 up of conjoined and spaced uprights 18, around which may be a covering of flexible or semi-flexible material 19, which acts as a setting or background for the concrete to be applied.

80 The backgrounds 20 and 21, adjoin the corner frame 17, and may be practically identical with the background 1, described in Fig. 1, with the exception that the adjoining ends 22, and 23 may be of greater angularity to give a larger area for the cement
85 to be blown in.

Suitable sets of reinforcing rods 24 and 25, may be placed in proximity to the frame or background at points where the ends of
90 the backgrounds 20 and 21 adjoin, and these rods may be tied together in any convenient and strong manner, and to the reinforcements 10 and 11, which are provided, as seen, for the outer and inner walls, respectively, and
95 an additional reinforcement 28, may envelop the corner background to give added strength and rigidity.

Fig. 3 represents a different structural formation, retaining in detail all the characteristics of the forms shown in Figs. 1 and 2, for which reason, the foregoing description may likewise apply to this Figure, and similar characters of reference have been
100 applied.

Heretofore I have described in connection with Figures 1, 2 and 3, a wall or other unit, consisting of an inner and outer face, with integral studding or other members, and
110 spaces at intervals, forming a composite hollow wall.

This method, however, is not limited to that form of unit, nor to any of the other forms herein disclosed, nor in fact to any special form; as illustrative of the application of this method to a unit having but one face, Fig. 4 is referred to. Therein it will be seen that the single composite face
115 29, with integral members 30, may constitute a wall construction per se. The projecting stud portions 30 are not connected by a wall or other structural face, but may form the means for supporting a partition or other covering, as a combination of lath and plaster, whereby the unit may retain its
125 hollow character.

Such a wall unit may be reinforced by any desired material as expanded metal, wire mesh and the like, as shown at 31. The stud members may have vertical re-
130

inforcing bars 32, that may be tied together by any wire reinforcement 33, and the reinforcement may be surrounded by a similar reinforcement 34, that is preferably tied to the reinforcement for the face.

As in other instances referred to, the cement is applied under pressure to a background or setting 35, either self-supporting or by any suitable means supported.

- 10 Fig. 5 shows the application of my method to a construction susceptible of use for movable or floating structures, such as ships and the like, and has the advantage of economy in forms, reinforcements, and concrete, together
15 with greater flexibility than solid concrete, and increased lightness.

The method of forming walls and other units for this purpose consists in setting up a plurality of cylindrical or other elements, forming backgrounds, preferably
20 light hollow shells or bodies 36. These shells or bodies are horizontally or vertically disposed and spaced apart determined distances.

- 25 Reinforcement 37 for the front and rear faces may thereupon be set in proper relation to such bodies, so also reinforcing horizontal or vertical bars 38, may be oppositely disposed and tied together by any
30 suitable means, as wire or other metal 39, which also ties together the entire reinforcing system into a composite unit.

Cement under pressure is then applied to the backgrounds, that may be of any cheap

material, as paper, sheet iron, and the like, 35 and the application continued until a composite structural unit is formed, with intervals of hollow spaces created by such hollow shells or bodies.

The hollow spaces may be filled with any 40 suitable substance, either solid or liquid, but preferably the latter, and in that case, an oil of heavy gravity to prevent percolation of water through the cracks that may appear in the cement. 45

What I claim is: —

1. A hollow cementitious wall comprising a plurality of background units with a space between two or more units, the opposing walls of adjacent units converging 50 from the outside toward the inside, reinforcing secured to the faces of the background, and cement enveloping the individual units to form an integral wall.

2. A cementitious wall comprising a plurality of backgrounds disposed in spaced 55 relation, the opposing walls of adjacent backgrounds converging from the outside toward the inside, reinforcement supported in spaced relation with such backgrounds 60 to form a composite interlocked structure, and cementitious material enveloping the individual backgrounds, whereby to form a wall of a hollow character with intermediate integral conjoining members. 65

In testimony whereof, I have signed my name to this specification.

JAMES C. HAIN.