

June 9, 1931.

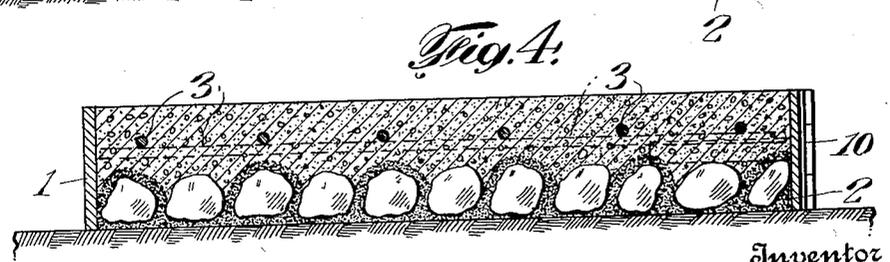
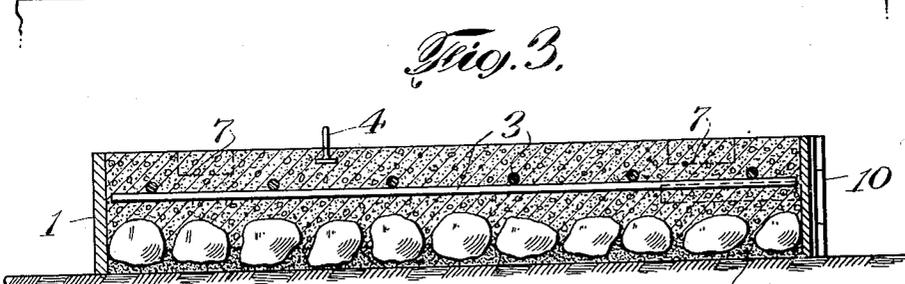
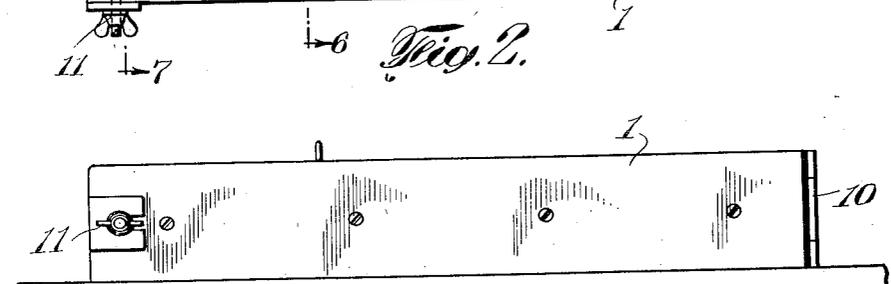
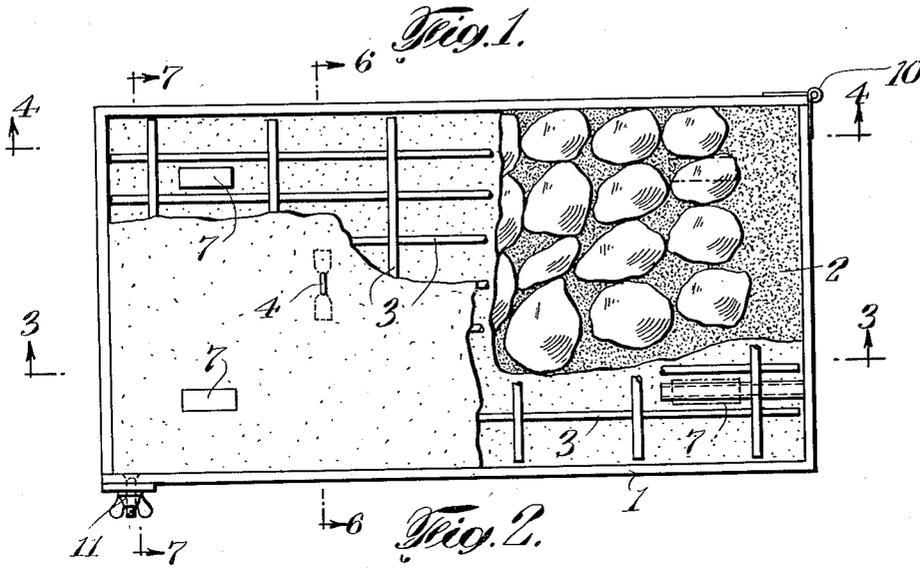
R. CARVEL

1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 1



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R. CARVEL

1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 2

Fig. 5.

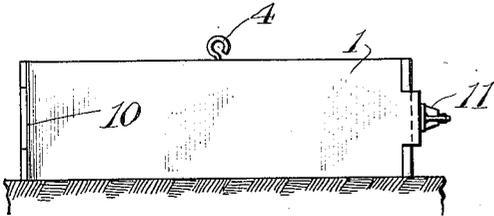


Fig. 6.

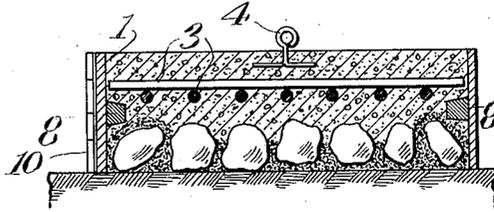


Fig. 7.

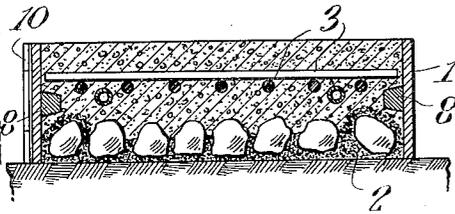


Fig. 8.

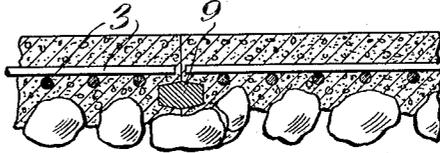


Fig. 9.

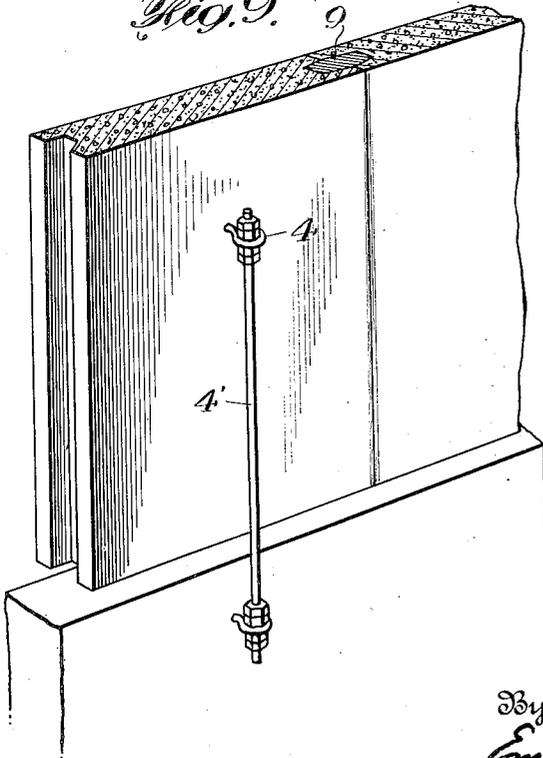
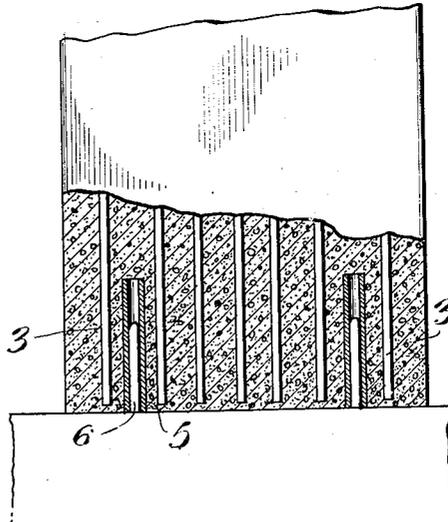


Fig. 10.



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1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 3

Fig. 11.

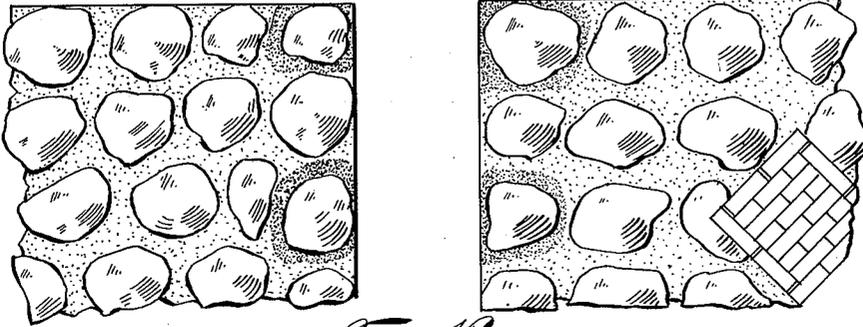


Fig. 12.

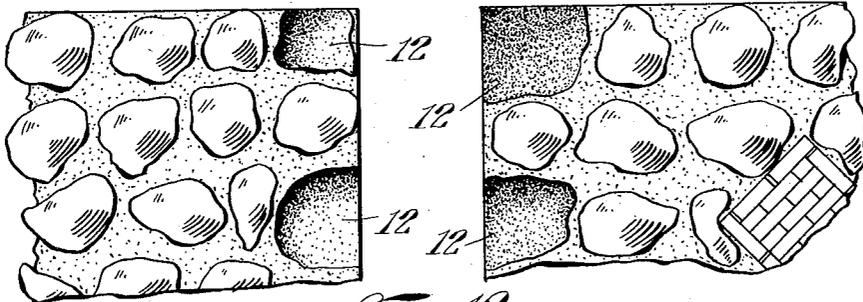


Fig. 13.

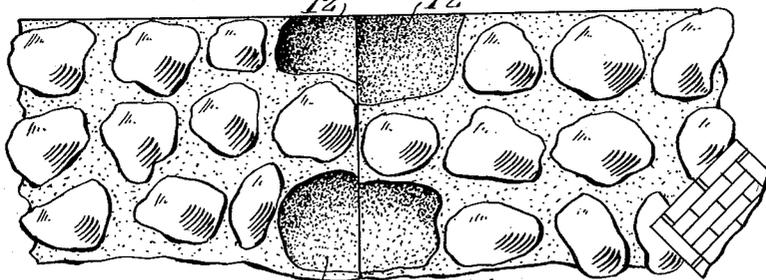
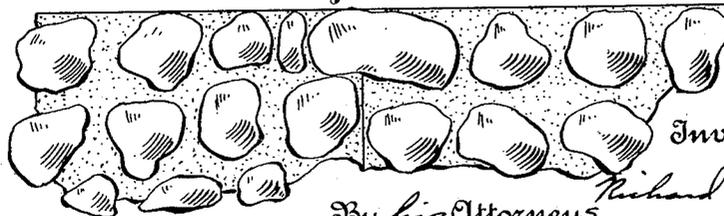


Fig. 14.



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R. CARVEL

1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 4

Fig. 15.

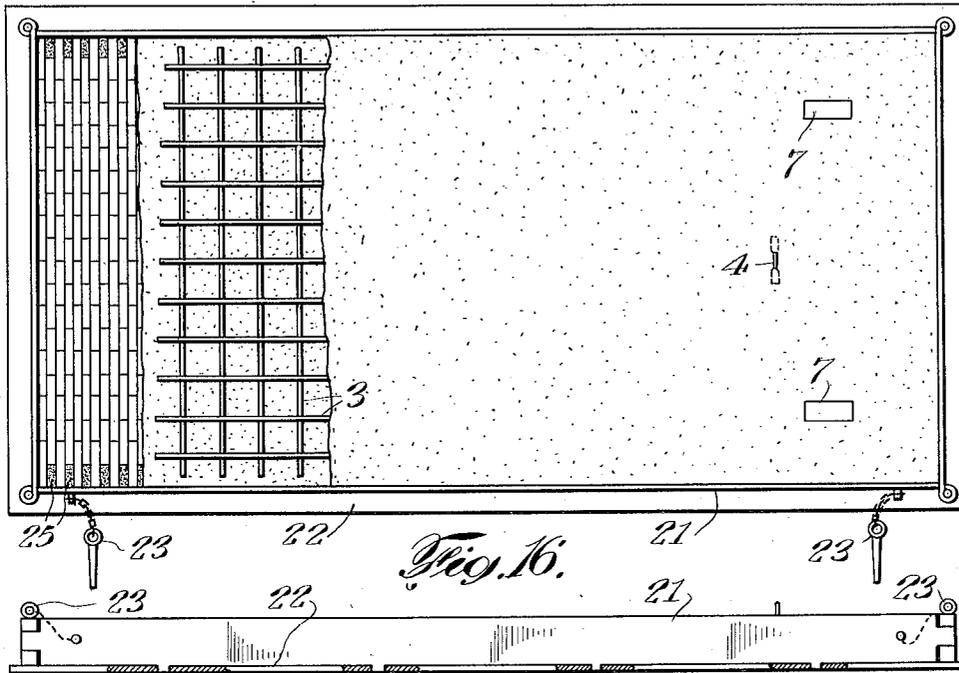


Fig. 16.

Fig. 17.

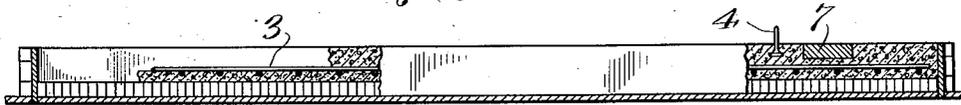


Fig. 18.

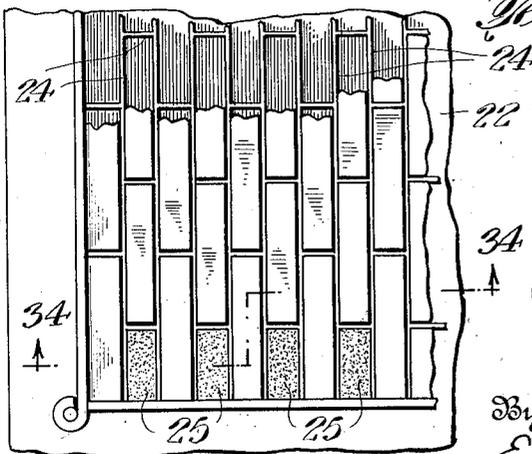
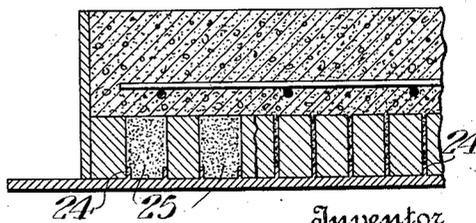


Fig. 34.



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June 9, 1931.

R. CARVEL

1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 5

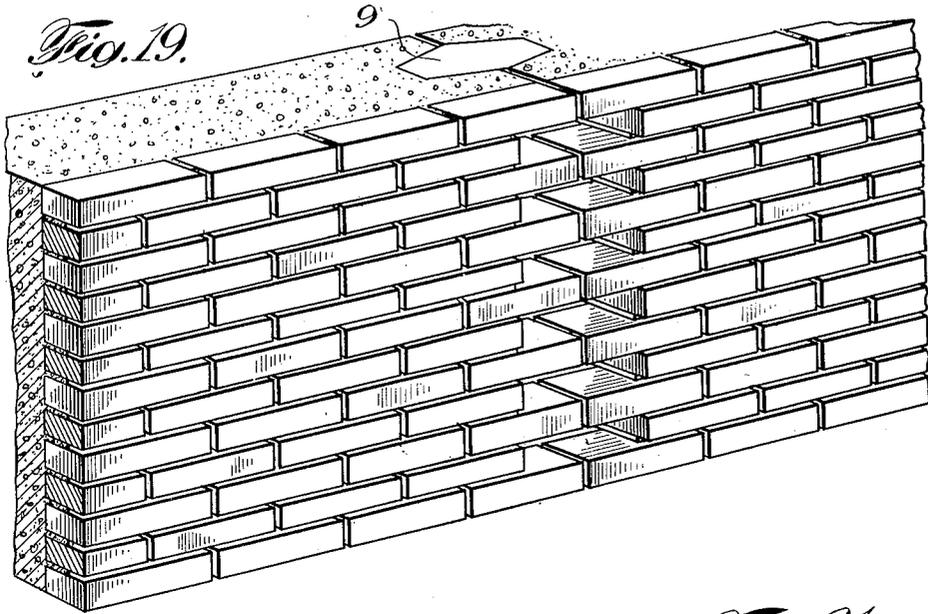


Fig. 20.

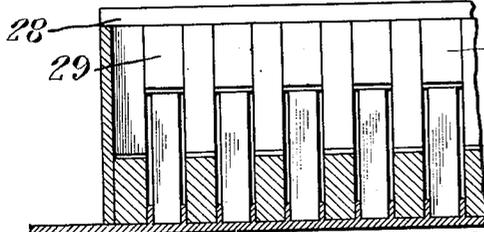
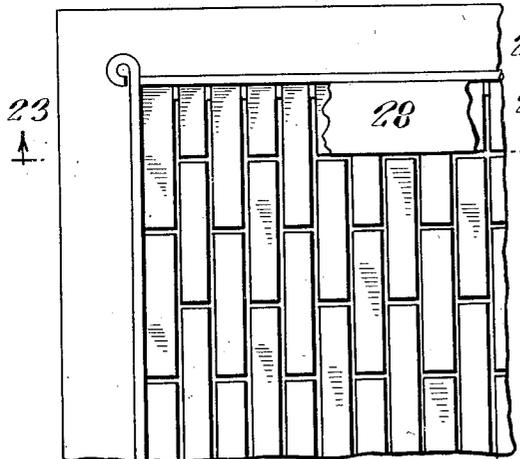


Fig. 23.

Fig. 21.

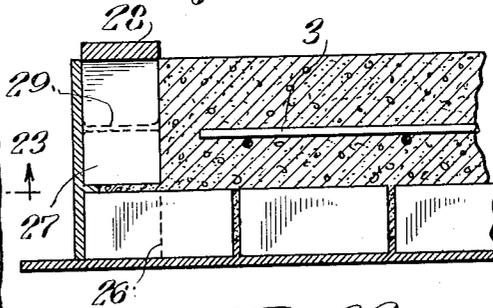
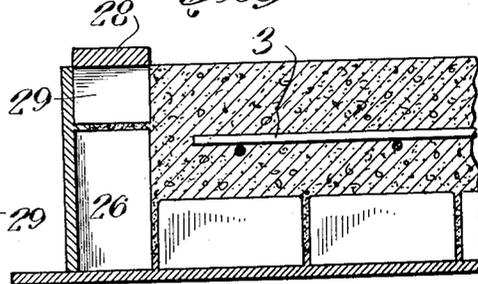


Fig. 22.



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R. CARVEL

1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 6

Fig. 24.

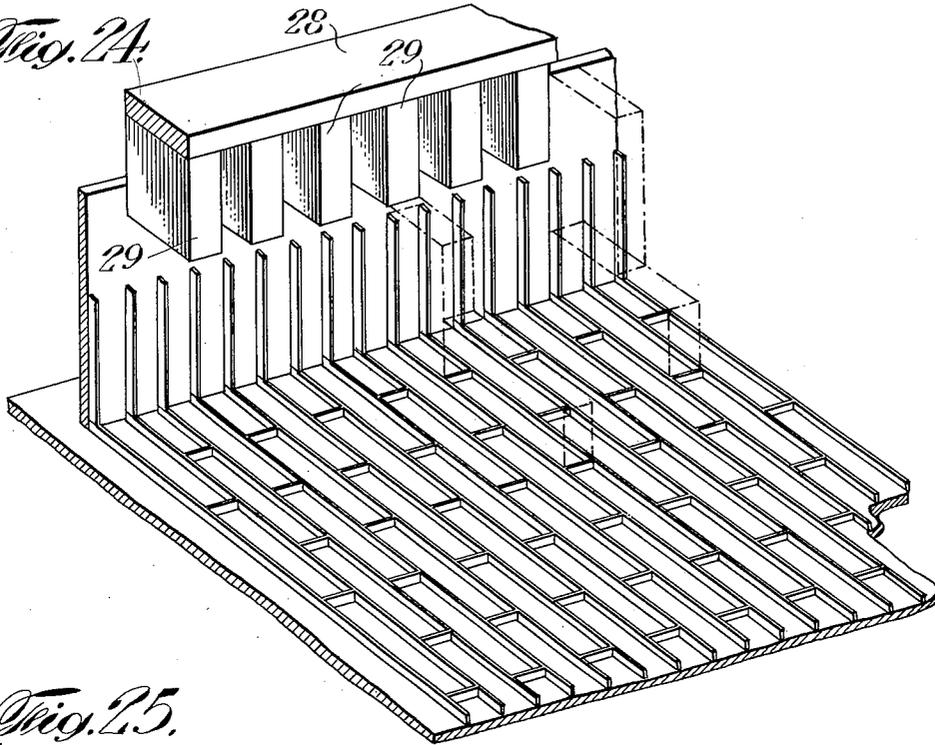
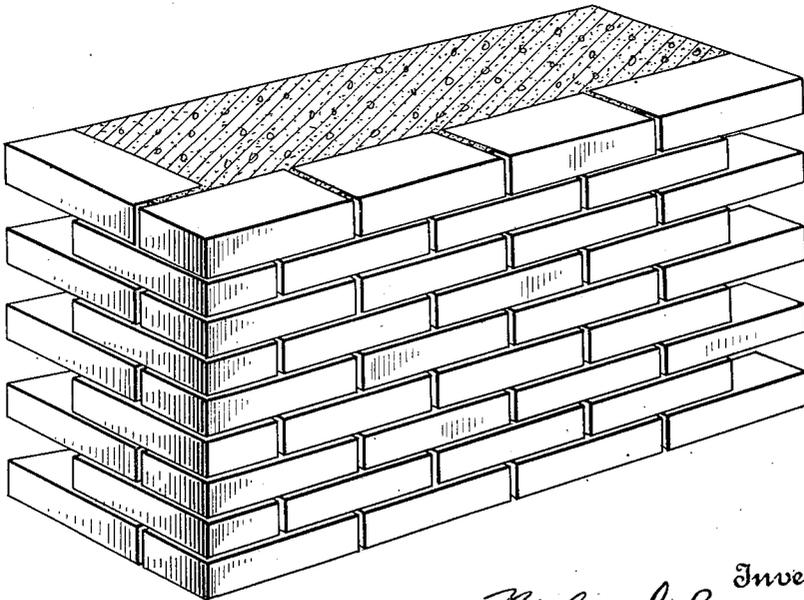


Fig. 25.



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1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 7

Fig. 26.

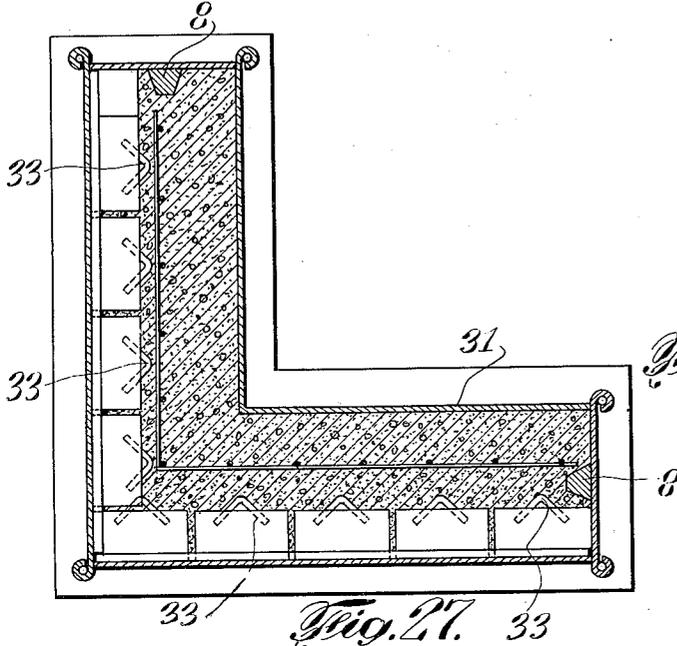


Fig. 30.



Fig. 27. 33

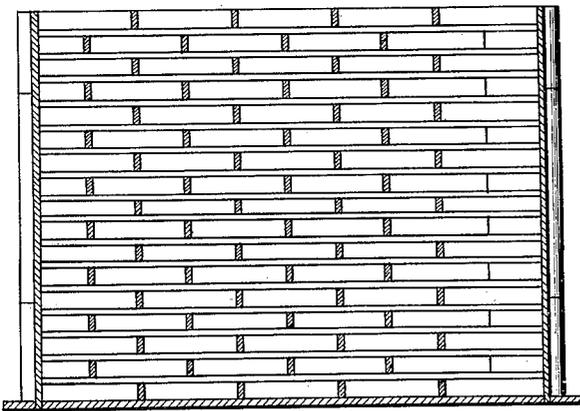


Fig. 29.

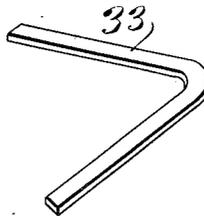
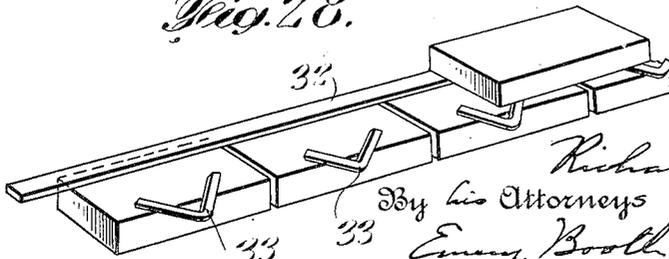


Fig. 28.



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1,809,504

BUILDING CONSTRUCTION

Filed Oct. 11, 1927

8 Sheets-Sheet 8

Fig. 31.

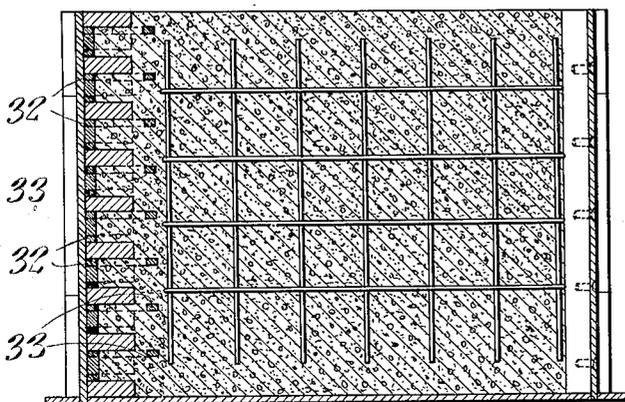


Fig. 32.

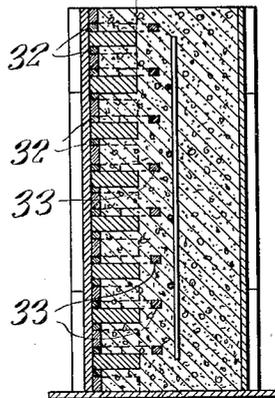
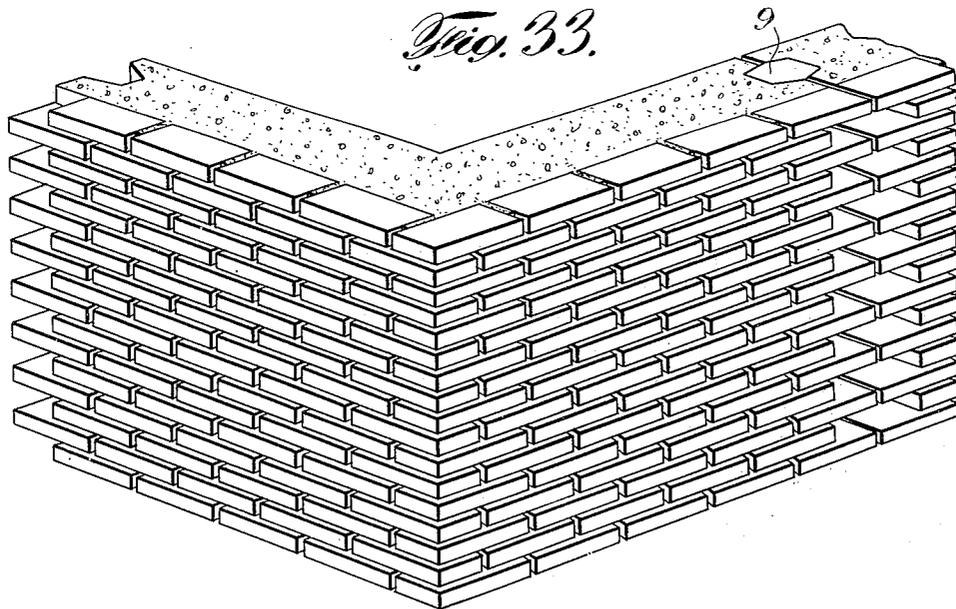


Fig. 33.



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UNITED STATES PATENT OFFICE

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BUILDING CONSTRUCTION

Application filed October 11, 1927. Serial No. 225,426.

This invention relates to building construction and pertains more particularly to methods of forming concrete wall sections having the external appearance of masonry or brick walls of the usual character, and capable of supporting the loads to which such walls are ordinarily subjected, but formed in such manner as to reduce the expense which is usually incidental to the making of masonry or brick walls by usual methods.

Other objects and advantages of the invention will appear hereinafter.

A preferred embodiment of the invention selected for purposes of illustration is shown in the accompanying drawings, in which,

Figure 1 is a top plan view showing the wall section in the process of formation, certain parts being broken away.

Figure 2 is a side elevation showing the enclosing framework.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1.

Figure 5 is an end elevation.

Figure 6 is a section on the line 6—6 of Figure 1.

Figure 7 is a section on the line 7—7 of Figure 1.

Figure 8 is a horizontal section through two of the finished wall sections illustrating the method of joining abutting sections.

Figure 9 illustrates means for holding the sections in vertical position.

Figure 10 shows an alternative means of holding the sections in vertical position.

Figures 11, 12, 13 and 14 are side elevations illustrating the method of joining abutting sections.

Figure 15 is a top plan view of a wall section formed with a brick face.

Figure 16 is a side elevation of the surrounding framework.

Figure 17 is a similar view with certain parts broken away.

Figure 18 is a fragmentary top plan view showing the bricks in place between the spacer elements before pouring the concrete.

Figure 19 shows a section of wall illus-

trating the method of joining abutting sections.

Figures 20, 21, 22, 23 and 24 illustrate a method of forming a corner section.

Figure 25 illustrates the completed corner section.

Figures 26, 27, 28, 29, 30, 31, 32 and 33 illustrate an alternative method of forming a corner section, and

Figure 34 is a section on the line 34—34 of Figure 18, illustrating the method of introducing blanks for abutting sections.

In building construction it is common practice to build walls of brickwork or masonry by laying the bricks or stones unit by unit with careful attention to plumbing as the wall is erected in order that the wall may lie in a true vertical plane when completed. This time honored method of construction involves the exercise of great skill in order that the finished wall may be straight and true, and skilled workmen must be employed to perform the labor.

According to the present invention it is proposed to form members or sections of wall of substantial size on the ground, or on any level surface which may be provided for the purpose, which said members may then be hoisted in place either by hand or by suitable machinery to form a part of the wall under construction. The said sections may have the external appearance of masonry or brickwork, or a combination of the two, and may be designed to have the requisite strength to support the stresses to which they may be subjected. It is also proposed to form the said sections in such manner that after they are set into place, abutting sections may be so treated as to conceal the line therebetween, so that the external appearance of the finished wall may present an unbroken appearance similar to the appearance of a wall constructed by the usual methods.

Two facing materials will be described herein in detail, namely, stone and brick, in order that the principles underlying the invention may be thoroughly understood, although it will be understood that other facing materials may be employed in the same manner if desired. For purposes of conven-

ience, the method will first be described with respect to stone and then with respect to brick.

Referring to Figures 1, 2, 3 and 4, a framework 1 may be provided of any desired length and width and of a depth sufficient to provide a wall of the desired thickness. Said framework need not be provided with a bottom, as it may be conveniently laid upon any fairly level piece of ground. After the framework is constructed a layer of comminuted material such as sand is laid within the framework to a suitable depth, as for example, 3" or 4", and then upon this layer is laid a layer of stone of which it is desired to form the face of the section. The separate pieces of stone may be laid fairly closely together and if necessary may be cut or broken to provide the desired shapes and sizes. In laying the layer of stone, the separate pieces may be caused to embed themselves in the layer of sand to a depth equal to that which it is desired to have the stones project in the finished member. Reinforcing bars 3 may then be laid in place, if desired, and a layer of concrete is then poured into the framework to cover completely the layer of stone. As will be observed, the concrete penetrates the interstices between the stones as far as the layer of sand which serves to protect the front faces of the stones. If desired, suitable eyes 4 may be embedded in the concrete to aid in handling the finished section and to serve as an anchoring means. For example, as illustrated in Figure 9, a bolt 4' may be secured between two eyes to hold a section in desired position. If desired, the section may also have embedded therein at any desired position short sections of pipe 5 which may serve to receive dowel pins 6 to anchor the members to a fixed support such as a water table. If desired, wooden blocks 7 may also be embedded in the upper surface of the concrete to serve as surfaces to which lath may be nailed.

Referring to Figures 6, 7 and 8, if desired, in order to furnish a convenient means of securing abutting members together, the sides of the framework 1 may have secured thereto longitudinally extending blocks 8 which form grooves in the nature of keyways in the sides of the members so that when the members are placed together in the manner shown in Figure 8 the grooves may be filled with grout 9 thus bonding the members securely and forming, in effect, a solid wall. In order that the completed member may be easily removed from the surrounding framework, the framework may be formed in two or more sections which are pivotally connected as by the hinges 10 and which may be held together at the opposite corner by the pin 11.

In order to provide an external appearance of uniformity at the points where abutting members are joined, it has been found desirable to treat the sections in a manner which

permits overlapping stones to be inserted after the sections have been set into place. Accordingly, during the formation of the member, certain of the stones along the edge of the member which is to be joined to an adjacent member are surrounded with a layer of sand, in the manner illustrated in Figure 4, in order that when the concrete is poured the said stones may be separated from the concrete and will not be bonded thereto as the concrete sets. As illustrated in Figure 4, alternative stones have been thus surrounded with a layer of sand, although it is to be understood it may be sufficient to treat a less number in this manner with good results.

As will be observed, after the concrete is set the member may be removed from the surrounding framework and the sand in which the stone was embedded will drop away leaving a stone surface closely resembling a masonry wall built by usual methods. At the same time the stones which have been surrounded by the extra layer of sand will also drop out of place leaving the voids 12 which are illustrated in Figure 12. As illustrated in Figure 13, when the members are placed together the voids which have been formed in this manner are brought together and may be filled as illustrated in Figure 14 with stones which overlap the two members and conceal the joint. The said overlapping stones may be conveniently secured in place with a small amount of concrete.

As has been illustrated in Figures 11, 12 and 13 inserts of brick 13 may be formed in the sections if desired in order to provide a decorative arrangement.

Referring to Figures 15 to 19 inclusive, it will be observed that the method as applied to the formation of a member having a brick face is similar to that employed to form a member having a stone face. In case of the brick, however, it has been found desirable to provide a bottom for the framework since greater regularity of surface is required in the case of brick than in the case of stone. The framework 21 is, therefore, provided with a bottom 22, and for convenience in removing the member from the framework, each side member of the frame is removably connected to the adjacent side members as by means of the pins 23.

In order that the bricks may be laid evenly and spaced in the proper relationship, the spacers 24 may be provided which may be secured to the bottom of the frame in any desired manner. In forming the member, the bricks are laid into the frame between the spacers 24 and after being laid suitable reinforcing bars may be introduced, and concrete may then be poured into the frame as previously described. For certain purposes it is desirable before pouring the concrete to fill the interstices between the bricks with grout (a mixture of sand, cement and water

without any stone or gravel) up to within one inch or a half inch of the top of the bricks so as to prevent the small stones which are usually present in the concrete mixture from slipping down between the bricks and resting on the spacing material, thus spoiling the external appearance of the joint between the bricks. After the grout has been poured, concrete may be poured into the frame as previously described. If desired, in order to produce color effects, the grout may be colored by the use of the usual materials. As will be observed, the concrete or the grout penetrates the interstices between the bricks as far as the spacers, thus serving to bond the bricks securely together, but the spacers serve the function of the sand used in connection with the stone, in that they protect the front faces of the bricks from the concrete. If desired, eyes and nailing blocks may be embedded in the concrete in the same manner as in the case of the stone faced member.

In order to break the line between adjacent members the method used in the case of the stone is followed in general. As illustrated in Figures 18 and 34, at the edges of the abutting members alternative bricks are omitted and the voids are filled with sand as illustrated at 25, so that when the members are removed from the frame and set in place as illustrated in Figure 19 the sand drops out, and spaces are provided which may be filled with bricks which may be set in place by hand after the abutting sections are set in place.

Referring to Figures 21 to 25, a method of forming a corner has been illustrated in which the bricks are laid in the manner previously described. At the end of the framework where it is desired to form a corner, a row of vertical bricks 26 is laid resting on the bottom of the box and a second row of vertical bricks 27 is laid resting on the horizontal row beneath. In order to prevent the concrete or grout from filling the voids between the bricks forming the row 27, a framework 28 is provided having blocks 29 which fill the voids between the bricks and prevent the concrete or grout from running in. This framework may be removed after the concrete is set but before it has hardened. As illustrated in Figure 25, the completed member presents edges having alternate voids which may be filled with bricks in the manner previously described when the next adjacent member is set in place.

Referring to Figures 26 to 33 inclusive, an alternative method of forming a corner is disclosed in which an L-shaped frame 31 is used having sides which may be pivoted if desired for easy removal. According to this method, the spacer elements 32 instead of being arranged on the bottom of the box are arranged on the side walls thereof, and in

order to support the rear edges of the bricks additional spacer elements 33 are provided which are preferably V-shaped so as to provide two points of support. After the wall is laid to the desired height, reinforcing bars may be introduced and concrete or grout poured as before.

Thus, according to the proposed method, the sections may be formed on the ground by unskilled labor and after forming may be lifted into place in the wall and secured there in any desired manner. It will be understood that while the frames disclosed herein for purposes of illustration are rectangular in shape, the method may also be employed to form wall sections of any desired shape such as may be designed by an architect for use in any particular part of a building. For example, by providing frames of the desired shape, arches, lintels, and the like, may be formed of any desired size and shape as specified by an architect.

It will be understood that the invention may be variously modified and embodied within the scope of the subjoined claims.

I claim as my invention:

1. The method of forming a wall which comprises precasting a concrete section of sufficient size to form a substantial part of a finished wall, embedding in the front face of said wall during the precasting operation units of facing material such as stone, bricks or blocks which are commonly used in buildings walls, forming voids in said facing material along abutting edges of said sections, hoisting said sections into position, and filling in said voids by embedding units of similar facing material therein, arranged to overlap the joint between the sections.

2. The method of constructing a brick-faced wall of large pre-formed sections which comprises arranging face down in a positioning and protecting form a layer of bricks in mutually spaced relation, arranging along an edge of said layer means for producing voids for the embedding of bridging bricks, applying cement-mix over said layer to penetrate between the bricks to bind the same together and to form a backing slab behind the same of a substantial thickness, allowing the cement-mix to set to form a unitary brick-faced concrete wall unit, removing said unit and assembling it adjacent other units with voids juxtaposed to the voids of said unit, and embedding bridging bricks in said juxtaposed voids to bridge the line of assembly of said units to produce a continuous brick-face on said wall.

3. The method of constructing a masonry-faced wall of large pre-formed sections each comprising a multiplicity of normal sized masonry building elements, which comprises arranging face-down in a positioning and protecting form a layer of such elements in mutually spaced relation, arranging along

an edge of said layer means for producing
voids for the embedding of bridging ele-
ments, applying cement-mix over said layer
to penetrate between the masonry elements
5 to bind the same together and to form a back-
ing slab behind the same of a substantial
thickness, allowing the cement-mix to set to
form a unitary masonry-faced concrete wall
unit, removing said unit and assembling it
10 adjacent other units with voids juxtaposed
to the voids of said unit, and embedding ma-
sonry bridging elements in said juxtaposed
voids to bridge the line of assembly of said
units to produce a continuous masonry-face
15 on said wall.

In testimony whereof, I have signed my
name to this specification this 10th day of
October, 1927.

RICHARD CARVEL.

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