May 22, 1934. A. J. BARZAGHI 1,959,653

CONSTRUCTION OF SELF SUPPORTING STRUCTURES

Filed Sept. 6, 1930 2 Sheets-Sheet 1

Fig: 1.

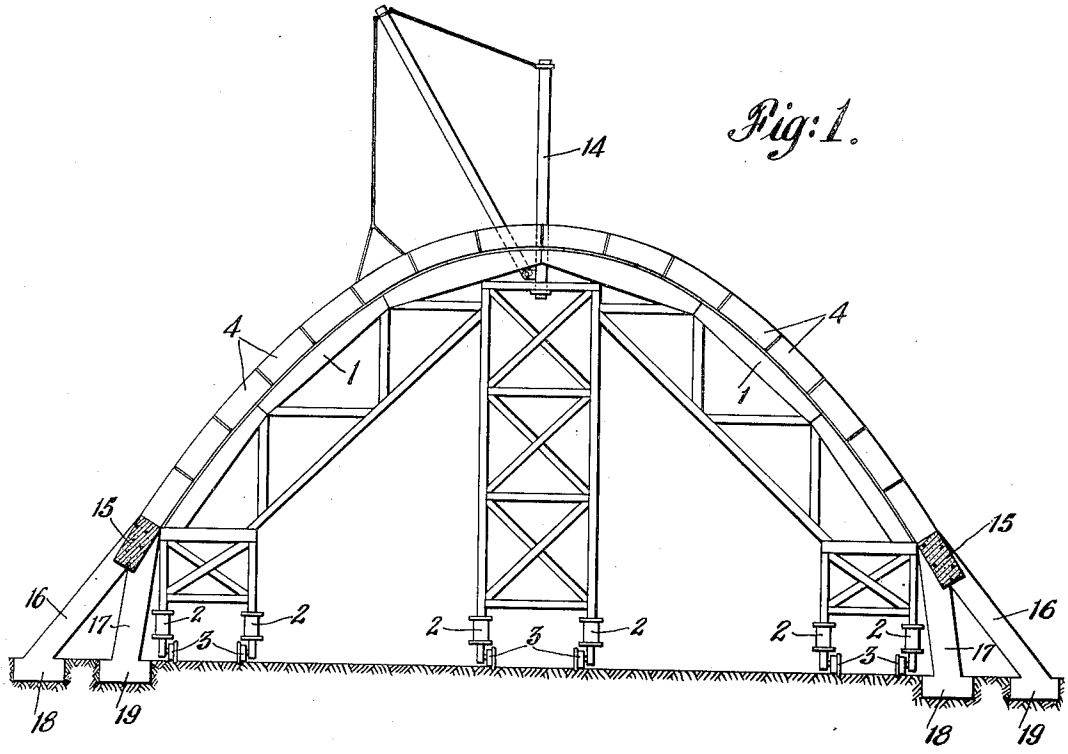
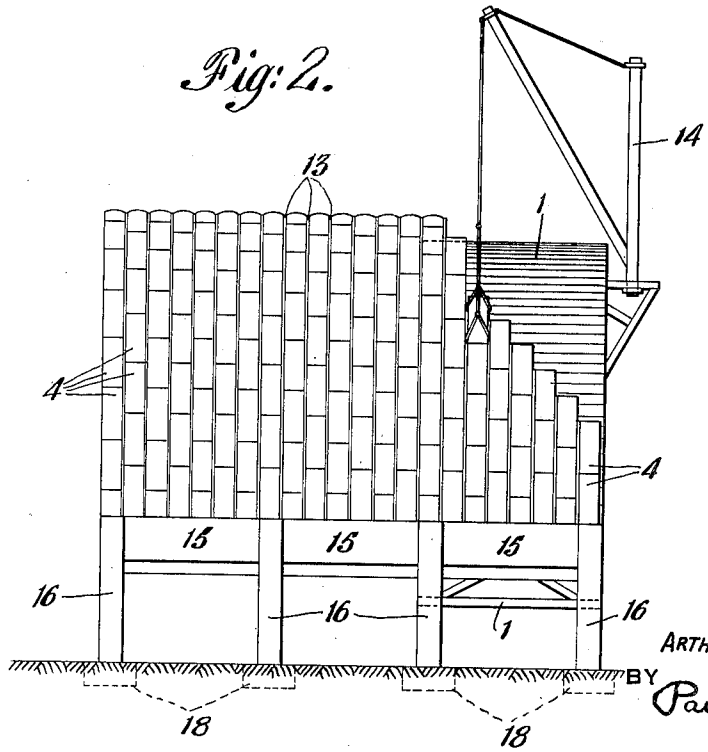


Fig: 2.



INVENTOR
ARTHUR J. BARZAGHI
BY
Paul R. Ames
ATTORNEY

May 22, 1934. A. J. BARZAGHI 1,959,653

CONSTRUCTION OF SELF SUPPORTING STRUCTURES

Filed Sept. 6, 1930 2 Sheets-Sheet 2

Fig: 3.

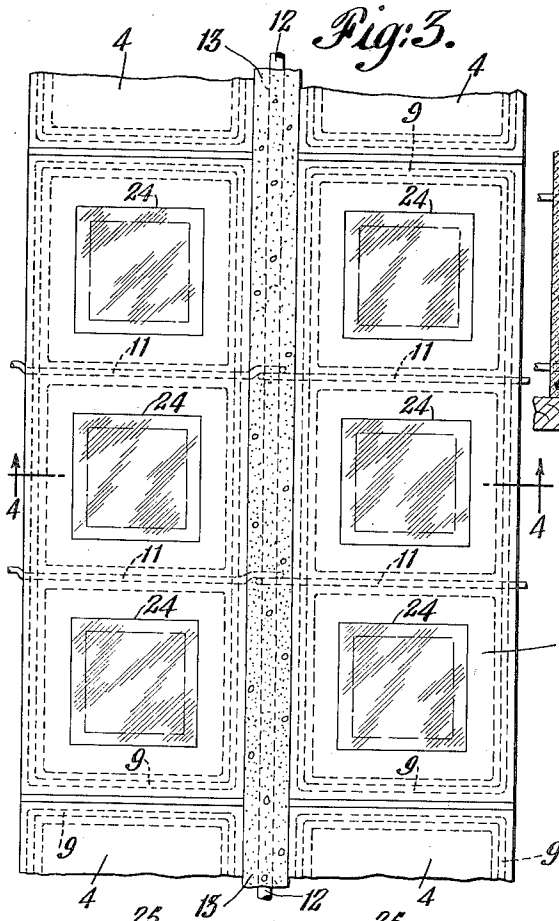
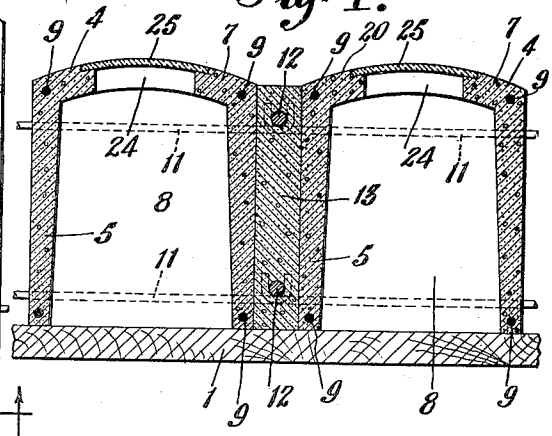


Fig: 4.



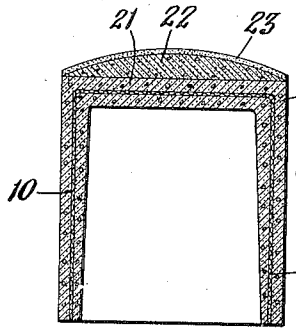


Fig: 7.

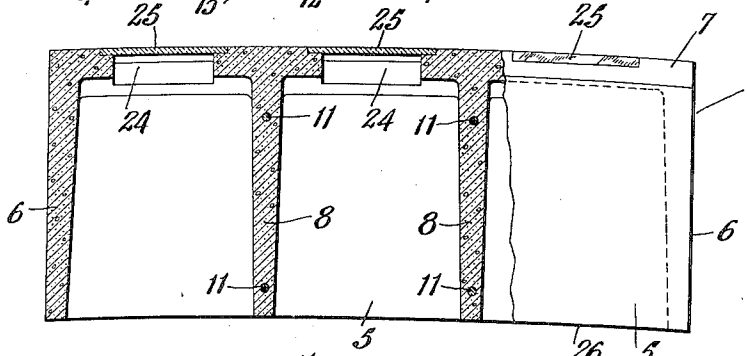


Fig: 5.

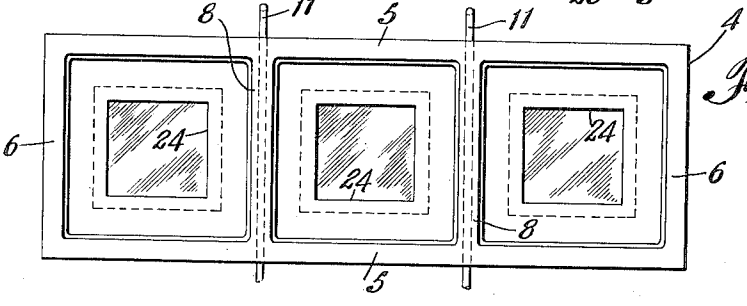


Fig: 6.

INVENTOR
ARTHUR J. BARZAGHI
BY Paul R. Ames
ATTORNEY

Patented May 22, 1934

1,959,653

UNITED STATES PATENT OFFICE

1,959,653

CONSTRUCTION OF SELF-SUPPORTING STRUCTURES

Arthur J. Barzaghi, New York, N. Y.

Application September 6, 1930, Serial No. 480,052

11 Claims. (Cl. 72—55)

This invention relates to building constructions and more particularly to an improvement in the art of building self-sustaining structures from preformed blocks.

In the building of arched concrete structures, it is common practice to employ removable "centers" or forms to support the construction while it is being built. In using such forms it is ordinarily necessary to leave the "center" in position for several weeks until the concrete has set completely, in order that the concrete will be sufficiently hardened to take the entire thrust of the arch. The delay resulting from this procedure is often objectionable in that it ties up large quantities of equipment and causes delay.

It is an object of this invention to provide an improved method for building self-supporting structures, by which the construction of the structure will be facilitated and hastened. A further object is to provide a means and method for constructing arched concrete structures whereby the supporting forms may be promptly removed. Another object of the invention is to produce a pre-formed block of improved shape for use in constructing built up structures. It is also an object to produce a construction having improved light transmitting characteristics and to provide preformed blocks for producing such construction. A further object is to produce a building structure of improved load carrying characteristics. Other objects will become apparent.

In describing the invention as applied to the construtcion of a concrete building, reference will be made to the drawings in which Figure 1 is an end elevation illustrating the construction of a building utilizing my invention. Figure 2 is a side elevation of the construction shown in Figure 1. Figure 3 is an enlarged fragmentary elevation of a portion of the completed building. Figure 4 is a cross-section taken on the line 4—4 of Figure 3. Figure 5 is a side elevation, partly in section, of one of the blocks illustrated in Figure 4. Figure 6 is a bottom plan view of the block shown in Figure 5. Figure 7 is a section through a modified form of my improved building block.

In the several drawings, the numeral 1 indicates the "center" which may be of any suitable construction to support the pre-formed blocks during the formation of a section of the building. The numerals 2, 2 designate a series of jacks adapted to raise the "center" into position and to lower it after a section is completed. These jacks may be supported upon wheels 3, 3 in order that the "center" may be readily moved from one position to another after the completion of each section.

The pre-formed concrete blocks 4, 4 used in constructing the building may be formed and allowed to stand long enough to become sufficiently hard to sustain the compression loads to which they will be subjected in the finished arch. These blocks may be constructed as shown in Figures 4, 5 and 6 with side and end walls 5 and 6, respectively, covered by an arched top 7. The side walls 5, 5 are connected by partitions 8, 8 which serve to strengthen the block. Each block 4 may have reinforcing rods 9, 9 extending in the form of closed horizontal loops through the walls of the block. If preferred this reinforcing may be supplied in the form of wire mesh extending through the walls and roof of the block, as indicated at 10 in Figure 7. It may also be desirable to further reinforce the blocks by passing rods 11, 11 through each partition 8 of the block. These rods may extend through the side walls and be turned up at their ends to provide supports for longitudinal reinforcing rods 12, 12 to be positioned in the joist 13.

When the construction of a building in accordance with my invention is started the blocks 4, 4 may be placed in rows along the surface of the center, by means of a derrick 14, leaving a space between each row to form a continuous joist extending from one side of the building to the other. A thin layer of binding material, such as an asphaltic cement, may be placed between the adjacent ends of each of the blocks as they are placed in position. Reinforcing rods 12, 12 (see Figure 4) extending from the base of one side of the construction to that of the other, may be positioned in these spaces and may be supported upon the rods 11, 11 or may be otherwise supported. Concrete is then poured into the space between the adjacent rows of blocks.

In constructing the "center" I prefer to give its outer surface such a shape that each row of blocks will form an arch of approximately parabolic shape or will take the form of an inverted catenary. This form is preferred because by using it the line of thrust for uniform dead load will fall approximately on the axis of the arch.

It is also preferred to use base supports at each side of the building like those indicated in Figures 1 and 2, although the building may be constructed without them by extending the side walls to the ground. When these supports are used the blocks in the lower rows rest upon

beams 15 which are supported at their ends upon the angularly disposed braces 16 and 17 bearing upon the bases 18 and 19. If preferred the bases 18 and 19 may be connected together. With this form of support the load is distributed over a longer base and a more stable construction results. Also, since the braces 16 and 17 are spaced longitudinally along the building, as illustrated in Figure 2, this form of construction permits the installation of entrances through the sides of the building at convenient points.

By constructing the building in the manner described, each line or row of blocks will become self-supporting as soon as the row is completed. Therefore, when the concrete poured into the joists between the adjacent rows of blocks has taken an initial set the "center" may be withdrawn from beneath that section and may be moved to the next section. It is apparent that by using this method the forms used to support the arch during its construction may be removed from each section in a greatly reduced time as compared to that required to produce a final set in all of the concrete of the arch.

The rows of pre-formed blocks serve as forms for the sides of the joists during the pouring and hardening of the cement in the latter, and since they form a self-supporting arch, they also serve to carry the dead load of the building during the final hardening of the concrete in the joists. When the concrete in the joists has become completely set, the blocks become an integral part of the building and the support of the dead load of the building is divided between the blocks and the joists. The joists, with the reinforcing rods therein, will also carry any eccentric loads or unbalanced wind loads which would tend to throw the arch out of its self-supporting alignment.

In forming the blocks to be used as described above, concrete may be poured into molds, in which any reinforcing to be used has been suitably supported, and the blocks may be formed with or without the application of pressure. If the block is to have an arched surface, the mold may be shaped to give a configuration similar to that indicated at 20 in Figure 4 or, if preferred, it may be given a rectangular or some other suitable form, as indicated at 21 in Figure 7, and the top 22 may be trowelled on after the block has been formed. If a water-proof surface is desired, this trowelled on portion may be of asphaltic or some other water-proof material or the pre-formed surface may be simply painted or otherwise coated with a suitable water-proofing material, as illustrated at 23.

The partitions or ribs 8, 8 form lateral supports for the side webs or walls 5 of the blocks and thereby greatly increase the compressive strength of the relatively deep walled block.

When it is desired to transmit light through some or all of the blocks used to form the building, these blocks may be formed with glass vault lights in the spaces 24, 24. These vault lights may be curved as illustrated at 25, 25 or they may be flat or any other suitable shape. Because of the arrangement of the webs and ribs of the blocks, the light striking the building at an angle to the surface of a block will not be transmitted directly into the building but will strike the projecting walls 5 and 6 and the partitions 8, 8 and will enter the building as diffused light.

The bottom of each block may be curved as illustrated at 26 in order to fit the curve of the "center". In a construction of the shape illustrated, it is sufficient to form blocks of only two different curvatures, that is, one curvature for the side walls of the arch and a curvature of shorter radius for the top of the arch.

In constructing a building in accordance with my invention, the blocks 4 may be staggered, as shown in Figure 2, by starting each alternate row with a half or other portion of a block. If preferred, however, the blocks may be laid in rows which are even longitudinally, as illustrated in Figure 3.

Although I have described my invention as applied to a building made up of pre-formed concrete blocks, it is apparent that it may also be applied to a building made up of pre-formed blocks of metal or other suitable material, and these blocks may be held together by means other than the concrete joists shown and described. It is apparent that many other applications of the invention may be made and it is not intended to limit it to the particular embodiment disclosed. The terms used in describing the invention are used in a descriptive sense and not as terms of limitation and it is intended to include within the scope of the appended claims all equivalents of the terms used to define the invention.

What I claim is:

1. A building comprising a plurality of self-supporting arched rows of pre-formed, relatively deep, hollow blocks, each open at its inner side, said blocks being separated by continuous joists extending from the base at one side of the structure to the base at the other side of the structure.

2. A building comprising a plurality of self-supporting arched rows of pre-formed hollow blocks, each having spaced partitions extending between the longitudinal walls, said blocks being separated by reinforced concrete joists extending from one side of the building to the other.

3. A building comprising a plurality of self-supporting arched rows of pre-formed hollow hollow blocks, each block being open at its inner surface, having an inwardly extending partition connecting its longitudinal walls and having a portion of its outer surface adapted to transmit light, said rows being united by joists.

4. A building comprising a plurality of self-supporting arched rows of pre-formed blocks, each block having a convex outer surface, said rows of blocks being joined by continuous concrete joists formed to give a corrugated shape to the outer surface of the building.

5. A building comprising a plurality of self-supporting arched rows of preformed hollow blocks, each block having a partition connecting its longitudinal walls and having reinforcing bars extending longitudinally through said partition and projecting beyond the side walls and bent at an angle at their ends, and a concrete joist joining said rows, said joist having a reinforcing bar extending longitudinally through it and being supported upon the said projecting reinforcing bars.

6. A building comprising a plurality of self-supporting arched rows of pre-formed blocks, each row having its ends supported upon a beam carried by diverging piers extending upon opposite sides of the line of thrust of the arch, and concrete joists joining said rows of blocks.

7. A hollow building block composed principally of non-metallic material having partitions

connecting its lateral sides, having its inner side open and having portions of its outer surface adapted to transmit light.

8. A hollow building block composed principally of non-metallic material having partitions connecting its longitudinal walls, having its inner side open and having glass vault lights in its outer surface.

9. A building block open at its inner side, having an inwardly extending partition connecting its longitudinal walls intermediate the ends thereof and having a portion of its outer surface adapted to transmit light.

10. A building block having a partition connecting its longitudinal walls and having reenforcing bars extending longitudinally through said partition and projecting beyond the side walls and bent at an angle at their ends.

11. A building block having side and end walls surrounding a space formed therebetween, a top joining said side and end walls and being convex on its exterior surface, said block being open at the bottom, and a glass portion secured in said top, and being thinner than said top, for transmitting light through the top of said block.

ARTHUR J. BARZAGHI.