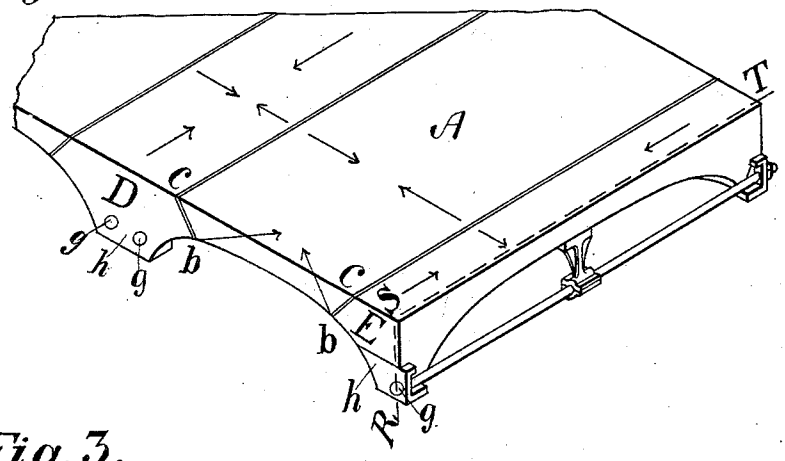
(No Model.)

P. H. JACKSON.

FORMING ARTIFICIAL STONE OR CONCRETE ARCHES.

No. 339,296. Patented Apr. 6, 1886.

Fig. 1.



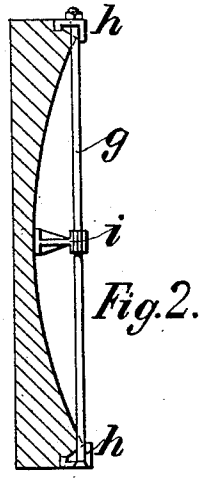
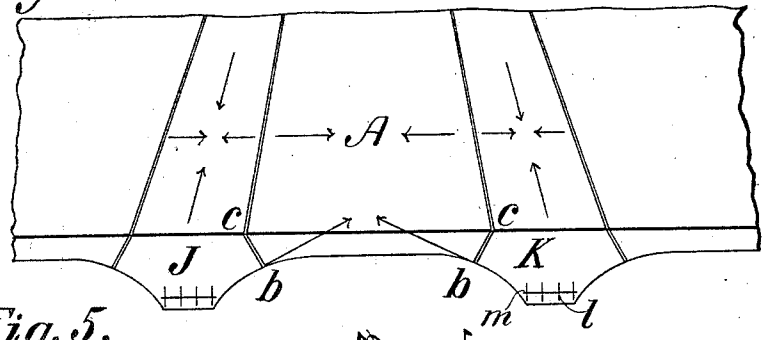


Fig. 2.

Fig. 3.



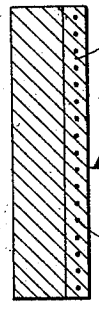
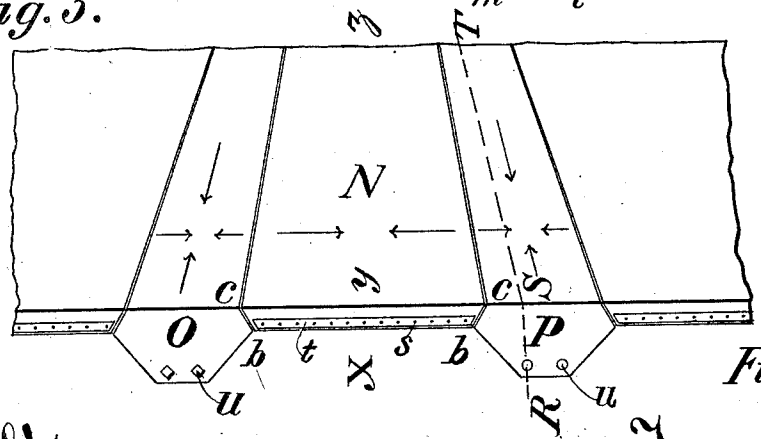


Fig. 4.

Fig. 5.



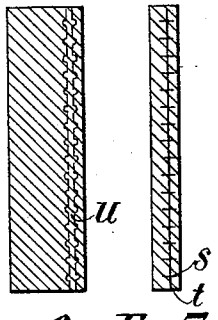


Fig. 6. *Fig. 7.*

Witnesses.

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UNITED STATES PATENT OFFICE.

PETER H. JACKSON, OF SAN FRANCISCO, CALIFORNIA.

FORMING ARTIFICIAL-STONE OR CONCRETE ARCHES.

SPECIFICATION forming part of Letters Patent No. 339,296, dated April 6, 1886.

Application filed March 21, 1885. Serial No. 159,701. (No specimens.)

To all whom it may concern:

Be it known that I, PETER H. JACKSON, of San Francisco, State of California, have invented a certain new and useful Improvement in Forming Artificial-Stone or Concrete Arches Forming Sidewalks and Floors of Buildings; and I do declare the following to be a full, clear, and exact description thereof, sufficient to enable any person skilled in the art to which my invention belongs to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is a perspective view of a direct concrete arch supported on the sloping sides of two transverse concrete arches from which they are separated, the top surface forming a sidewalk or floor surface. Fig. 2 is a longitudinal section of the concrete transverse arches in Fig. 1, with metallic ties tensilely strained, with struts and skewback-plates. Fig. 3 is a perspective view of a direct concrete arch supported on the sloping sides of two transverse concrete beams from which they are separated. Fig. 4 is a longitudinal section of the transverse concrete beams in Fig. 3, with metallic ties and cross-rods built in at or near the bottom of the beam to resist the tensile strain at that part. Fig. 5 is a perspective view of a slab used in the place of the direct arch shown in Figs. 1 and 3. For wide spans iron ties are built in at or near the bottom of the slab, as shown, to resist the tensile strain at that part, the slab resting on the sloping sides of the transverse concrete beam. Fig. 6 is a longitudinal section of the transverse beam on the line R S T, Fig. 5. The metallic ties with raised or roughened surfaces are built in at or near the bottom of the concrete beam. Fig. 7 is a longitudinal section of the concrete slab on the line *x y z*.

My invention relates to an improved method of forming artificial-stone or concrete arches over basements, cellars, or other chambers and excavations, the top surface forming an artificial-stone sidewalk or floor surface, and supported by transverse artificial-stone or concrete beams, whose top surfaces form the sidewalk, and the under surfaces are arching, forming an arched beam, with their abutting ends held from spreading by skewbacks and iron or steel ties; and for arches of large span struts are used, placed with the bottom ends resting on the ties and the top supporting the arch, the ties being employed to sustain the arch, and are exercised both tensilely and transversely, thus making a strong and cheap construction without the use of expensive supporting iron beams.

Plastic materials of which artificial-stone or concrete sidewalks and floors are formed shrink when drying and hardening, and when a large surface is formed in one piece, even if of a uniform thickness, as a sidewalk, which is about three inches thick, the shrinkage produces great tensile strain on the material, causing vertical cracks usually across the entire width of the sidewalk. Therefore to prevent cracking the sidewalk-slabs have to be made in small squares separated from each other, so that each piece may contract separately; but when the thickness is not uniform, as when the concrete beams and sidewalk are formed in one piece, the beams being much thicker and a much larger body of concrete than the arches or connecting-slabs between them, the beam parts draw away in contraction from the thin arches and crack the latter, thereby weakening the arch, defacing the sidewalk, and causing leaks to the apartment below.

My invention further lies in making and keeping the concrete arches or connecting-slabs separate from the transverse supporting concrete beams, so that each part may draw to itself in shrinkage independent of the adjoining piece without cracking. This is equally applicable in the making of sidewalks and floor-surfaces of contrete or artificial stone supported by concrete beams where the bottom surfaces of the beams are flat and held together by roughened metal ties in any shape, built in them, as described in Thaddeus Hyatt's patent for composition floors, roofs, pavements, &c., July 16, 1878, No. 206,112.

Another feature of my invention is in making the sides of the concrete or artificial-stone beams sloping, wider across the bottom of the slope than across the top, and with a separating material—as of tarred paper, thin sheet metal, or other equivalent material—built in so as to separate the sections; or the beams may be made first and when nearly dried molders' parting-sand or other like separating substance may be dusted on, destroying the cohesion at that place. Then the arch may be

formed between the concrete beams upon the centers and resting its sides upon the slopes of the beams, compressing both the beams and the arch and employing the material compressively in that direction.

Portland cement concrete or artificial stone is a very strong material when compressively employed, but not so when its tensile property is called into action.

In General Q. A. Gilmore's work entitled "Coignet Béton or other Artificial Stone," it is stated that the compressive to the tensile resistance of Portland cement-concrete ranges from fourteen to one to thirty-five to one, in accordance with the quantity of sand mixed with the cement.

By this construction not only do I overcome the injurious effects caused by the shrinkage of the material, but I largely increase its strength by the arches resting on the slopes of the beams, and what loads may come on their surface cause them to wedge and be compressed, while if they rested on a flat surface along the bottom edges at the sides, from the bottom surface up to the neutral axis would be subjected to separation, of which this material is feeble to resist. These intervening arches resting on the slopes may be lifted out without disturbing the concrete beams, and new ones replaced, as in case they are injured or broken by the front of the building falling on them in case of fire or from other causes.

Referring to the drawings, Figure 1 is a perspective view of the artificial stone or concrete arch A, resting on the sloping sides *b c* of the transverse concrete arches D E, and are separated from them by sheet metal, tarred paper, or parting-sand or other equivalent material.

The arrows indicate the parts as being compressed.

The transverse arch shown in the longitudinal section, Fig. 2, has metal tripods *g*, with metal plates or skewbacks *h* at the ends of the ties, and with the strut *i*, and for long spans additional struts. The bottom part of the transverse arches may be of brick or cement below a proper thickness for a sidewalk or floor surface.

In Fig. 3 the concrete arch A rests on the sloping sides *b c* of the transverse concrete beams J K, from which it is separated, as described in Fig. 1.

Fig. 4 is a longitudinal section of the transverse concrete beams J K, with metallic ties *l* and cross-rods *m*, or may be any kind of roughened metallic tie-rods, so as to hold to the concrete or artificial stone at or near the bottom of the beam to resist extension to which that part is subjected.

Fig. 5 is a perspective view of a concrete or artificial-stone slab, N, resting on the sloping sides *b c* of the transverse concrete beams O P, from which it is separated, as described in Fig. 1. This slab may rest on the transverse arches, as shown in Fig. 2, instead of the beams. Metallic flat bars *s*, with cross-ties *t*, are built in the bottom of the slabs, the parts subjected to extension—that is, when the slabs are large, but when otherwise no ties need be used. The transverse beams O P have either round or square ties *u* built in them with raised surfaces or depressions to hold on to the concrete or artificial-stone beam at or near its bottom, the parts subjected to extension; or flat ties with cross-rods near together will do equally as well.

Fig. 6 is a longitudinal section of the transverse beams through the line R S T, Fig. 5, showing the bars with raised and depressed surface.

Fig. 7 is a longitudinal section through the line *x y z*, Fig. 5.

The arrows in all cases represent the forces of compression, not only taking up all shrinkage of the material, but also employing the artificial stone or concrete in it strongest property.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sidewalk or floor consisting of artificial-stone or concrete arches supported by transverse arches of the same material, combined with metallic ties to resist the horizontal thrust, substantially as herein described.

2. A sidewalk or floor consisting of artificial-stone or concrete arches supported by transverse arches composed of artificial stone for the top, and the bottom of brick, and combined with metallic ties to resist the horizontal thrust, substantially as herein described.

3. A sidewalk or floor consisting of artificial-stone or concrete arches supported by transverse arches of the same material, combined with tie-rods and struts to resist both the horizontal thrust and deflection, substantially as herein described.

4. A sidewalk or floor consisting of artificial-stone or concrete arches or slabs resting on the sloping sides of the supporting side sections of the same material, combined with metallic ties tensilely employed in sustaining the structure, substantially as herein described.

5. A sidewalk or floor consisting of artificial-stone or concrete arches resting on the sloping sides of the supporting side sections of the same material, from which it is separated by tarred paper, sheet metal, parting-sand, or other equivalent separating material, the side sections combined with metallic ties tensilely employed in sustaining the structure, substantially as herein described.

6. A sidewalk or floor consisting of artificial-stone or concrete slabs with metallic ties built in them at or near the bottom and resting on transverse artificial-stone or concrete beams or arches combined with metallic ties, substantially as herein described.

PETER H. JACKSON.

Witnesses:
JAMES B. LANE,
HENRY HAUSTEIN.