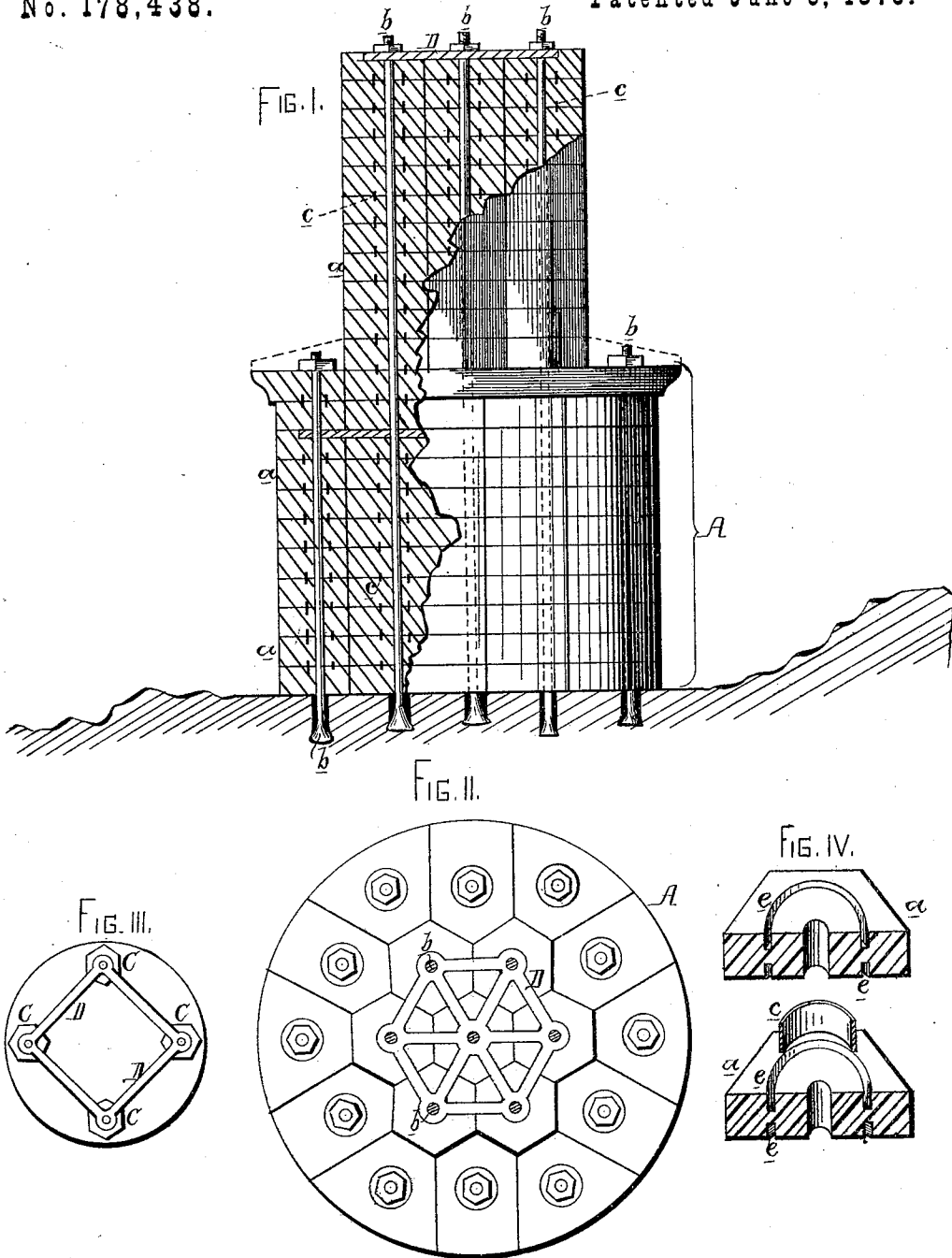


C. E. HILL.
COMPOSITE PIERS.

No. 178,438.

Patented June 6, 1876.



Witnesses,
Harry Howson.
Harry Smith

Charles E. Hill,
By his Attorneys,
Howson & Son

UNITED STATES PATENT OFFICE.

CHARLES E. HILL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN COMPOSITE PIERS.

Specification forming part of Letters Patent No. **178,438**, dated June 6, 1876; application filed October 5, 1875.

To all whom it may concern:

Be it known that I, CHARLES E. HILL, of Brooklyn, Kings county, New York, have invented an Improved Structure, of which the following is a specification:

The object of my invention is to build a cheap and substantial structure for piers, wharves, light-houses, foundations, &c.; and this object I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawing, in which—

Figure 1 is an elevation, partly in section, of a structure constructed in accordance with my invention; Fig. 2, a sectional plan; Fig. 3, a detached view, and Fig. 4 a diagram illustrating a modification.

The structure illustrated in the drawing consists of a lower portion or base, A, composed of nineteen hexagonal vertical columns, grouped together as shown, seven of these columns in the center of the group being continued upward above the base. It should be understood, however, that this illustrates but one way of carrying out my invention, which may be applied to structures of various forms employed in engineering and architectural work.

The blocks *a a*, of which the structure is built, are bound to each other and to the foundation by vertical metallic bolts *b*, firmly anchored to the foundation, passing through openings in the blocks, and provided at the upper end with nuts, keys, or other fastenings, as fully described in the Letters Patent granted to me on the 25th of August, 1874, and numbered 154,393.

In place of, or in conjunction with, the pin-dowels described in said patent, for preserving the relative positions of the blocks, I insert, between adjacent blocks *a a*, ring-dowels *c*, fitting corresponding annular recesses *ee* in the faces of the blocks. (See Fig. 4.) The rings are embedded in cement in the recesses, which cement, upon hardening, forms, with the rings, absolute barriers to the passage of water, through the joints between the blocks, to the bolts *b*, and the latter are thereby effectually protected from the deteriorating action of moisture. The dowels serve the further purpose of preventing the blocks from moving laterally independently of each other, and

the bolts *b* are consequently relieved from transverse strains.

The structure, as before remarked, consists of a series of columns, each having a central bolt, *b*, anchored to the foundation, and each column consists of a series of blocks of hexagonal or other shape, so that the grouping of all closely together forms a continuous structure, which may be indefinitely increased in its dimensions or altered in form by the mere increase in the number or change in the disposition of the columns.

In order to bind the various columns together, I employ one or more metallic spiders, D, consisting of bars united at points coinciding with the different bolts *b*, each of which passes through an opening in the spider at one of the said junctions, as shown in Fig. 2, grooves being cut in the blocks to a sufficient depth to permit the spider to be inserted, it being preferable that the upper face of the spider be flush with that of one tier of blocks, as shown in Fig. 1.

Where the different columns which compose the structure are not in juxtaposition, as in Fig. 3, where the four columns C of the structure are isolated, the arms or bars of the spider extend from one to the other, so as to bind the whole firmly together.

In some instances the bars composing the spider, instead of being united, may be separate from each other, each bar having an opening at each end for the passage of one of the bolts *b*.

I claim as my invention—

1. The combination of a series of columns, each bound to the foundation by a bolt, *b*, with a spider, D, through which the said bolts pass, and by which the columns are bound together, substantially as specified.

2. The combination of the recessed blocks *a a*, bolts *b*, and ring-dowels *c*, inclosed in the recesses of the blocks, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES E. HILL.

Witnesses:

WILLIAM HILL,
S. F. HILL.