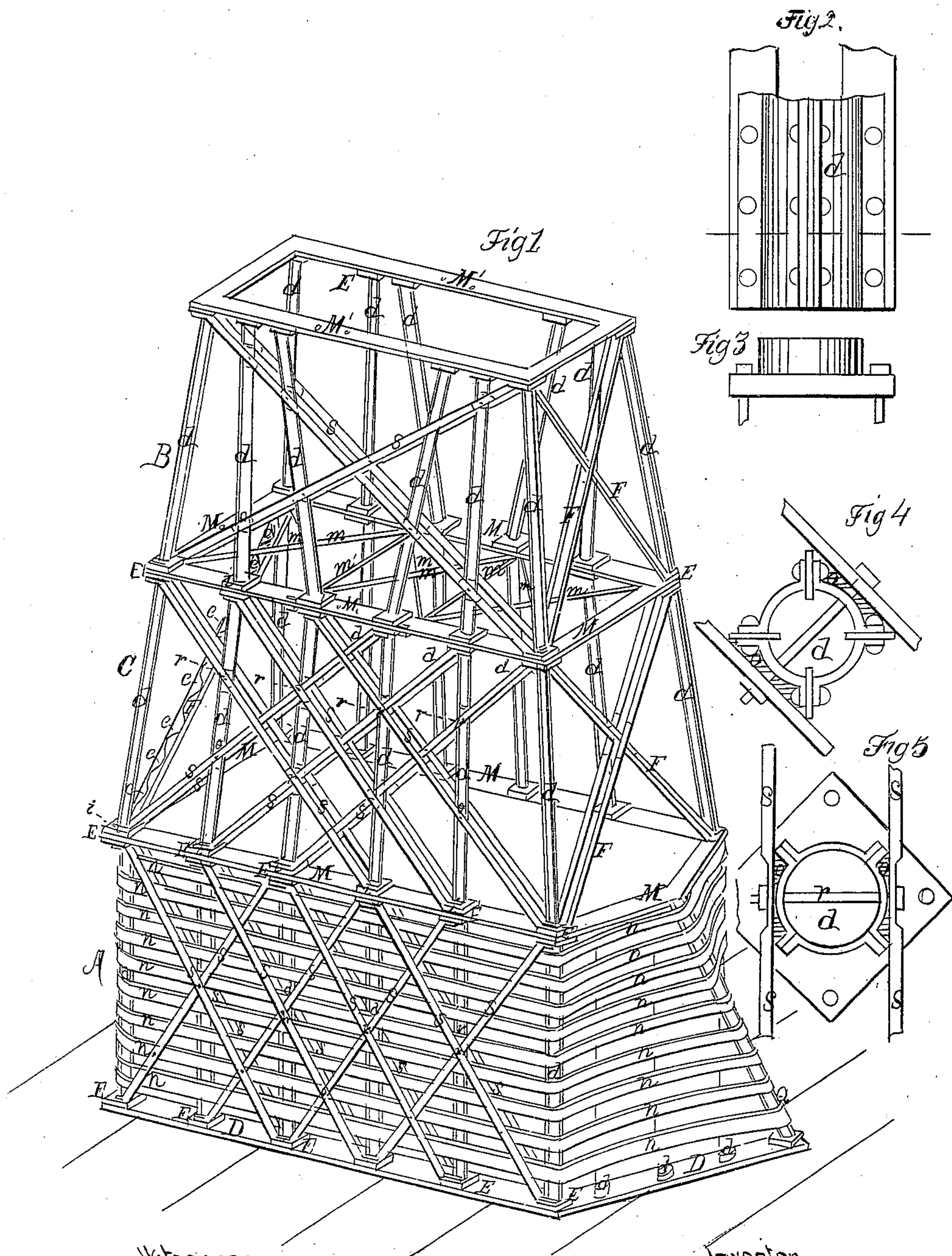


E. M. Grant,
Pier.

No. 85,171.

Patented Dec. 22. 1868.



Witnesses:

J. C. Keyser
C. A. Petrus

Inventor:

E. M. Grant
Per. Messrs. H. C.
Attorneys

United States Patent Office.

EDWARD M. GRANT, OF MACON, GEORGIA.

Letters Patent No. 85,171, dated December 22, 1868.

WROUGHT-IRON BRIDGE-PIER.

The Schedule referred to in these Letters Patent and making part of the same:

To all whom it may concern:

Be it known that I, EDWARD M. GRANT, of Macon, in the county of Bibb, and State of Georgia, have invented a new and improved Wrought-Iron Pier for Bridges; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view.

Figures 2, 3, 4, and 5 represent details of construction.

This invention has for its object the construction of a simple, strong, cheap, and durable iron pier, for bridges and other lofty structures.

The pier is built in sections, A B C, the construction of the lower section being shown at A, that of the upper section at B, and that of the intermediate sections at C.

The number of intermediate sections will be determined by the height and strength required in the pier. The whole rests upon a heavy course of masonry, supported by and connected with the usual foundation of rock or crib-work, filled with concrete on the inside, even with the upper surface of the masonry, and well ripped on the outside.

The pier consists of twelve wrought-iron columns, *d d*, arranged, six on each side, and braced, supported, and connected, as shown in fig. 1.

The twelve columns are of the pattern known as the "Phoenix patent," manufactured at Phoenixville, Pennsylvania, the general nature of which may be seen from figs. 2, 4, and 5.

D is a cast-iron plate, extending around the top of the course of masonry, three inches thick by nine wide, bolted to the rock by bolts well leaded into the stone.

The lower ends of the columns, in the bottom section, are fastened by bolts, passing through this plate into the rock, and firmly fastened therein.

The columns are furnished with cast-iron caps, *E E*, fastened to them by small bolts.

Between each of the sections there is a system of lateral bracing, consisting of a cast-iron plate, *M*, three inches by nine, trussed with cast-iron braces, *m m*, and heavy wrought-iron rods, *m' m'*.

Bolts, *i i*, pass through the plates *M*, and through the caps of the columns, above and below each section, thus securing the columns together into one continuous system, from the top to the bottom of the pier.

The columns have a batter, of from one inch to one foot, in both lateral and longitudinal directions of the pier, and are firmly braced and tied together by wrought iron stays, *s s*, bolted to them, as shown in fig. 5, the cast-iron pieces *o o* affording the requisite means of contact between the stays and the columns.

In section A there are eight pairs of stays to each side of the pier; in section C, six pairs; and, in section B, only two pairs.

The relative length of these stays, and their points

of contact with the horizontal cast-iron plates, and with the columns, are clearly shown in fig. 1.

The ends of each section (except, in some cases, section A) are braced by diagonal stays, *F F*, arranged in pairs, and each pair strengthened by the bracing shown at *e e*, fig. 1.

The bridge-seat *M'* is of cast-iron, bolted to the tops of the upper columns. The inner columns of the upper section diverge, as seen in fig. 1, so as to be concentrated under each chord of the superstructure, thus consolidating the strength under the pressure, and, at the same time, adding greatly to the rigidity of the upper portion of the pier.

Q is a heavy wrought-iron column, standing out from the upper end of section A as a cut-water or "ice-break."

n n are wrought-iron bars, four inches wide and one-half an inch thick, placed three inches apart, and bolted to the columns in the same manner as the stays.

This sheathing prevents any floating substance from injuring the pier, and acts as a very efficient bracing. It extends above "high-water line" of the stream.

Having thus described my invention,

What I claim as new, and desire to secure by Letters Patent, is—

1. The lower section A, when constructed with the "Phoenix-patent" columns *d d*, the plates *D M*, the stays *s s*, the wrought-iron straps *n n*, the inclined column *Q*, the caps *E E*, and the cast-iron plates *o o*, all constructed, arranged, and bolted together in the manner described.

2. The upper section B, when constructed with the columns *d d*, inclined as described and shown; the cast-iron plates *M M'*; the stays *s s* and *F F*, the latter strengthened by the braces *e e*; the caps *E E*; and the cast-iron plates *o o*; all constructed, arranged, and connected together in the manner described.

3. The intermediate sections C C, when constructed with the columns *d d*, plates *M M*, stays *s s* *F F*, braces *e e*, caps *E E*, plates *o o*, and trusses *m m'*, all constructed, arranged, and combined in the manner and for the purpose specified.

4. The described arrangement of sections A B C, when severally constructed and connected in the manner described, so as to form a single pier.

5. In any pier, the use of wrought-iron straps *n n*, and iron columns *d d* *Q*, arranged as described, and bolted together, the straps extending around the front and sides of the pier, for the purpose of protecting it from floating ice, drift-wood, &c.

6. The described method of attaching the stays to the columns, to wit, the arrangement and combination of the stays *s s*, columns *d d*, iron plates *o o*, and bolts *r r*, substantially as shown and specified.

To the above specification of my improvement, I have signed my hand, this 8th day of September, 1868.

Witnesses:

EDWARD M. GRANT.

JNO. H. BASKETTE,

J. H. BURKE.