J. MILROY & J. W. BUTLER.

Construction of Piers.

No. 160,938. Patented March 16, 1875.

FIG. 1.

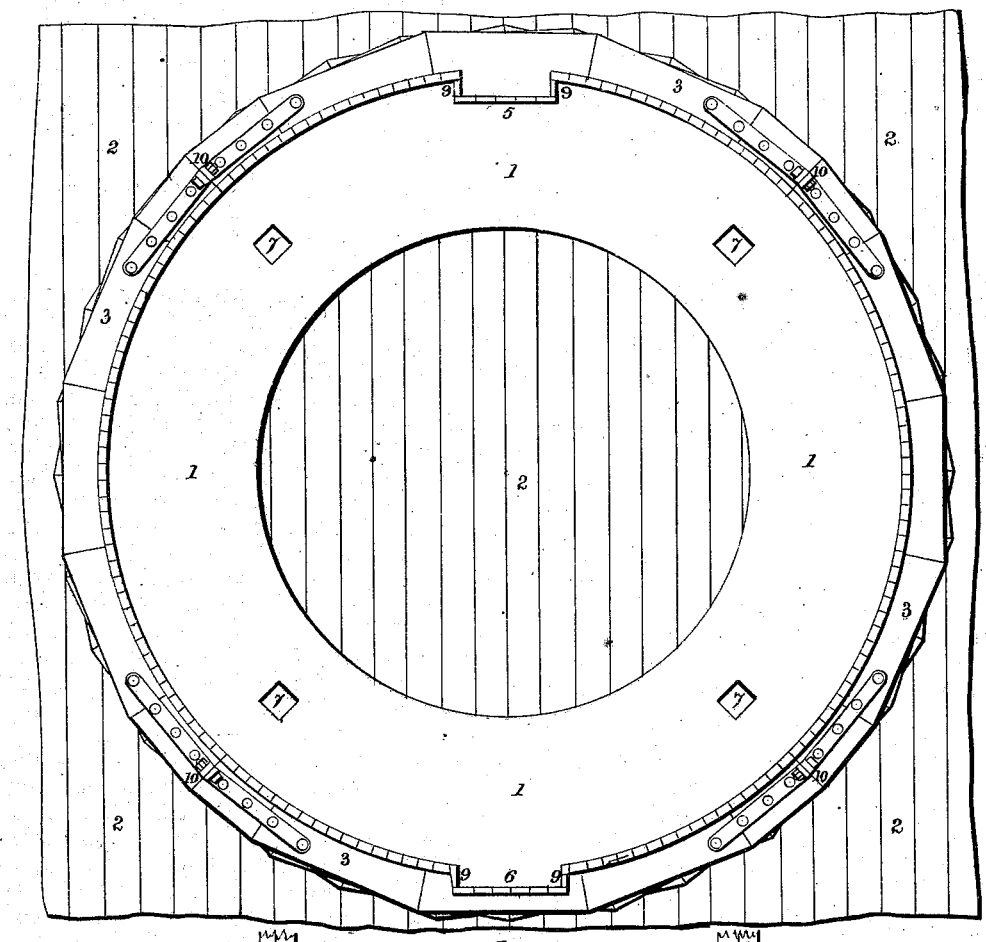


FIG. 2.

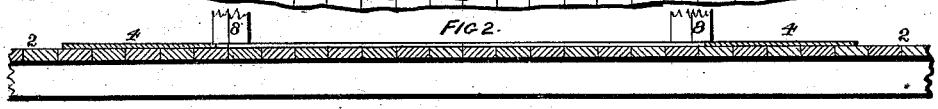


FIG. 3.

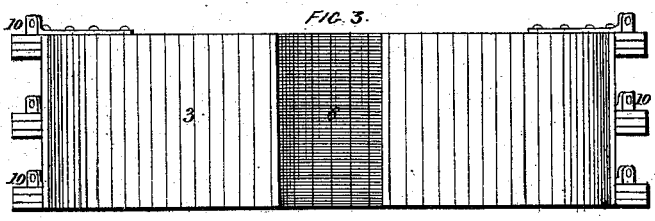
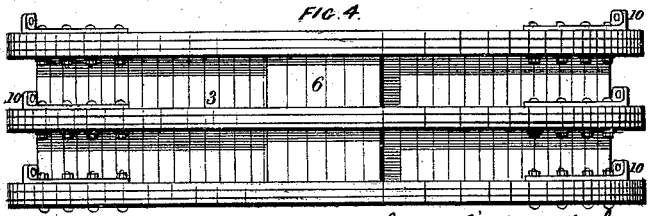


FIG. 4.



Witnesses,
Harry Smith
Thomas M. Shaw

John Milroy & Jas. W. Butler
By their Attys,
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UNITED STATES PATENT OFFICE.

JOHN MILROY, OF EDINBURGH, NORTH BRITAIN, AND JAMES WILLIAM BUTLER, OF WILLESDEN, ENGLAND.

IMPROVEMENT IN THE CONSTRUCTION OF PIERS.

Specification forming part of Letters Patent No. **160,938**, dated March 16, 1875; application filed October 16, 1873.

To all whom it may concern:

Be it known that we, JOHN MILROY, of the city of Edinburgh, North Britain, and JAMES WILLIAM BUTLER, of Willesden, in the county of Middlesex, England, have invented Improvements in Constructing Columnar Piers or Foundations, applicable also to coffer and other dams, of which the following is a specification:

Our said invention has for its object the construction of columnar piers or foundations of any section in an improved manner, when composed of concrete, brick-work, or natural or artificial stone-work, such columnar piers or foundations being applicable to quay and sea walls, piers, groins, bridges, breakwaters, coffer and other dams.

Our invention consists in making the piers in sections, either complete circular, rectangular, or other sections, or segmental sections, and in bringing each section so made to its position above the foundation or lower section, and lowering and securing it thereon, all as fully described hereafter.

We prefer to construct the pier of a series of annular sections or rings, 1, although other forms may be used, one of which is shown in plan in Figure 1 of the drawings. Each section is formed on a platform, 2, and within a frame or mold, 3, which may be conveniently constructed of wood, as shown, or of metal or other convenient substance, and in four or other convenient number of segments. Fig. 2 is a vertical section of the platform 2, and Figs. 3 and 4 are, respectively, inside and outside elevations of one of the segments of the frame 3. The arrangements delineated are those which we adopt when building up each ring with bricks bonded in strong Portland cement. An annular layer of wood, 4, of the shape of the ring 1, is fixed down upon the platform 2, and its outer edge serves as a guide for setting the segments of the frame 3 in their proper positions, while its inner edge serves as a guide in shaping the eye of the ring when building up the bricks. When the ring 1 is made of concrete an internal frame is required for shaping the eye. The ring 1 is shown as formed with a mortise, 5, at one side and a tenon, 6, at the other, which are for connecting or locking together a series of the columns or cylindrical piers when constructing foundations for a continuous pier or quay. Four holes, 7, (or it might be any other convenient number,) are molded in the ring 1 by means of loose pieces of wood 8, Fig. 2, set in sockets in the platform 2, and withdrawn when the building of the ring is completed. Similar loose pieces of wood 9 are set in sockets formed for them in the platform at the sides of the mortise 5 and tenon 6, to be afterward withdrawn separately, so as to free the segments of the frame or mold 3 from those parts, and thereby facilitate the removal of the segments.

In building the ring the Portland cement is applied so as to form a smooth coating on the outer and inner cylindrical surfaces, this being particularly attended to in regard to the outer surface, in order to, as much as possible, reduce the frictional resistance to the sinking of the pier or column. While the ring 1 is being built the segments of the frame 3 are held together by screw-bolts 10; but on the completion of the building these bolts are loosened, and the segments are separated and removed, after which the ring 1 is allowed to set and harden for about five days, when it can be removed from the platform, either to be stored or to be at once placed on a pier or column that is being sunk or constructed *in situ*. Rings of concrete or stone-work are constructed in a similar manner, but an inner frame, as well as an outer frame, is required. The rings are joined together with Portland cement, either by laying a bed of the cement in the usual way, or, after three or four thin pieces of wood have been placed on the lower ring and another has been lowered in its place, the joint between it and the one next below it is pointed with cement around the inside and outside, and cement is then run into the four holes 7, Fig. 1, provided for the purpose, and rammed well in, so as to spread throughout and fill up a small space left for the purpose between the two rings. Bricks may finally be inserted down the holes 7, to act as dowels between the rings, and thus prevent any movement of the rings upon each other; or wooden fish-pieces may be fitted inside the pier or columnar structure at the joints.

It is obvious that the peculiar mode of constructing cylindrical or columnar piers or foundations of any section may be applied to various purposes, as already stated; but we may specially mention its application to the construction of coffer and other dams, wherein the segments are made to answer the purpose of the more costly iron cylinders at present employed.

In applying our invention to the constructing of a dam we construct, in the manner already described, a number of molded blocks, which may be of a cylindrical form, and of about the same height as their diameter.

When several of these hollow blocks are piled one upon another, whether for dams or for columnar foundations, it is advisable, in order to insure their maintaining their proper places, to employ fish-pieces at the several joints, consisting of pieces of timber bolted close up to the outer and inner surfaces of the blocks, and extending equally across the joint; or, in lieu thereof, internal and external continuous fishes of wood or metal are employed, held together by bolts and nuts. These fishes may be countersunk, if preferred, so as to be flush with the surface, by suitably recessing the blocks at the parts where they are to be applied.

Wooden dowel-piles may be introduced between the several adjoining columns of blocks, and sunk along with them to make good the joints. Horizontal beams or walings may extend along the series of columns, so as to tie them together, and to admit of their being further supported by being bolted to a row of wooden piles. Boarding may or may not be secured to the walings, and the space behind filled in with puddled clay.

We prefer to make the curb or shoe mainly of a thin cylindrical shell, it being much more easily sunk, presenting a sharper and more elongated entering part, while from the extra space within it the excavating is more easily accomplished. The cylindrical shell is surmounted by a flat annular plate, the outer edge of which corresponds with and joins the top of the shell, and is additionally supported by radial brackets or feather-plates fixed or formed in the angle inside the shell. The bottom course of the building, or the bottom section or set of segments of the concrete brickwork or stone-work, rests upon the annular plate, and is fixed thereto by bolts, but, being wider radially than the annular plate, is corbelled or beveled at its bottom inner edge; or, in lieu of this shoe, any well-known or suitable form of shoe may be employed.

The soil may be excavated or removed from the interior of the cylindrical or columnar piers by any well-known apparatus.

We do not here claim the mode of molding the rings by means of segments, nor the mode described of uniting the segments, as separate applications for patents will embrace these features; but

We claim—

The mode described of building piers and other structures—that is to say, building a number of tubular sections independently, bringing each section so built to its position above the foundation or lower section, and then lowering the said upper section and securing it in position, all as set forth.

In witness whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN MILROY.
JAMES W. BUTLER.

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