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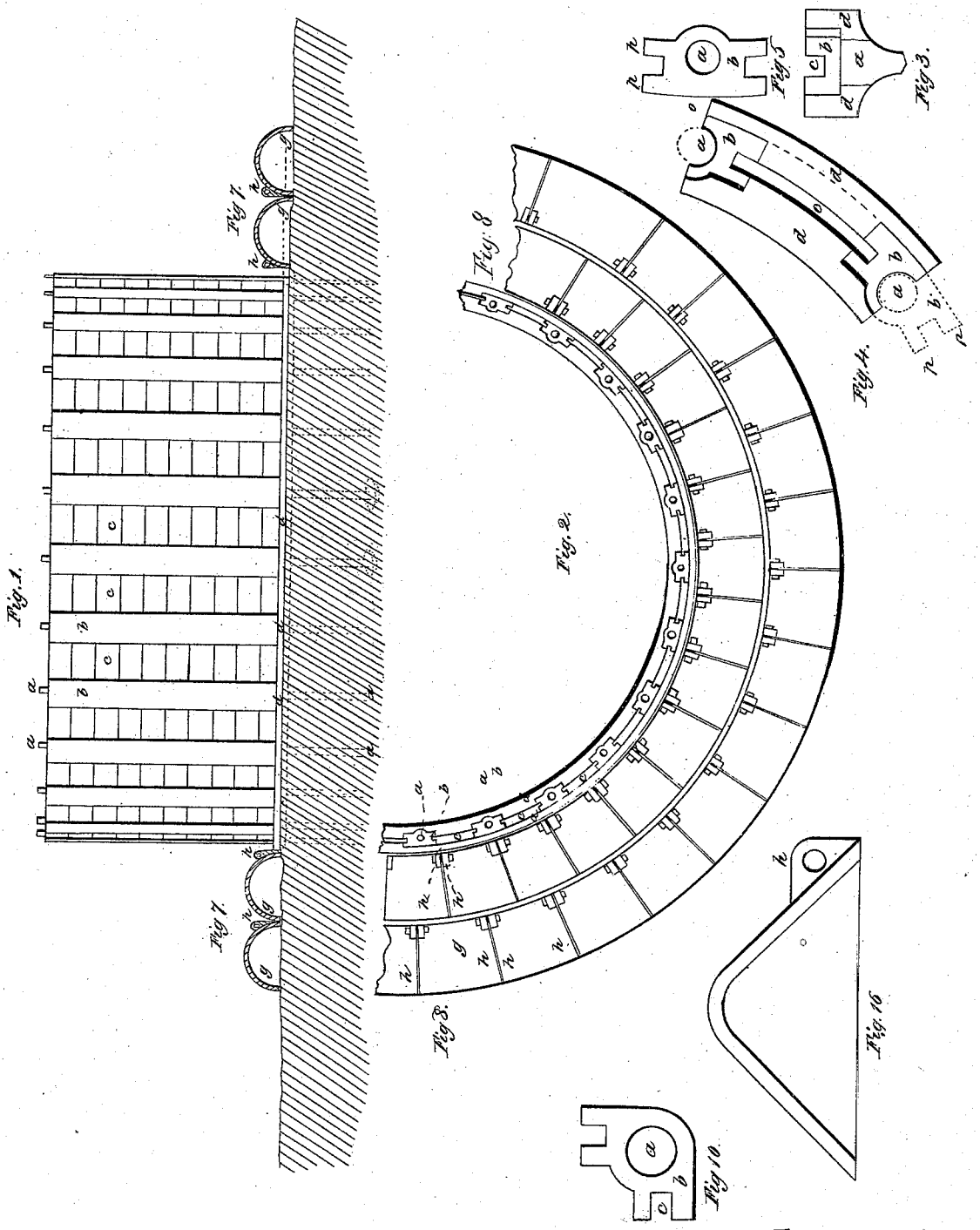

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METHOD OF OBTAINING PERMANENT FOUNDATIONS FOR HYDRAULIC STRUCTURES.

Specification of Letters Patent No. 4,030, dated May 1, 1845.

To all whom it may concern:

Be it known that I, ISAIAH W. P. LEWIS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and improved method of obtaining permanent foundations for all hydraulic structures and of protecting the said foundations from being undermined by the abrasion of the bottom owing to the action of tidal currents.

Of the nature of my invention the following is a full and exact description which with the drawings hereto annexed will enable any one to comprehend the mode of construction.

To construct a circular foundation as shown in elevation and plan by Figures 1, 2, a platform of temporary piling is first erected upon the site for the convenience of the workmen. An iron pile (wrought) of suitable length and diameter, and armed with one of Mitchell's patent screws at its lower extremity, is inserted into the ground or bottom, at a point occupying the exact center of the intended structure. This forms the guide pile to regulate the placing of all the other parts of the structure. A series of similar wrought iron screw piles are then inserted into the ground or bottom, at exactly equal distances each from the center guide pile and at exactly equal distances from each other, forming of course so many points in a great circle. Between each pair of piles so placed is next inserted a segmental piece of cast iron termed a bed socket shown in plan and end view by Figs. 3 and 4. One of these segments being placed between each pair of piles and resting its angular edge upon the ground or bottom, form consecutively a circular grooved and socketed surface to receive the parts of the superstructure as follow. Upon each pile is now fitted a tubular piece of cast iron, with projections at opposite sides, the horizontal section of which is shown at Fig. 5. The lower end of this tubular casting fits into the socket of bed plate Fig. 4, in the space marked *b*, and the projections on its opposite sides, *p*, *p*, form a perpendicular groove, in which are received the edges of the panels *c*, *c* (seen in Fig. 1,) and which panels and tubular pieces have a uniform circular surface as seen in plan Fig. 2. The shell of the foundation is then completely formed and is not strengthened by a series of tension rods hooked on to the several tubular pieces and other parts if found to be necessary, and all these tension rods are set up to the center guide pile by means of swivel screw joints. The cylindrical cast iron shell thus formed is then to be filled in with stone, concrete or other filling as may be found expedient. To protect the bed sockets aforesaid from being undermined and disturbed from their proper level by the action of tidal currents I adopt the following plan. As soon as the circle of iron piles are completed I put down outside thereof a complete circle of pieces of cast iron say six feet in length and diameter, of a convex segmental form as shown in section at Fig. 7 and in plan at Fig. 8, and these segments are all shackled together by bolts passing freely through hinge bosses cast on their inside angles as shown in section and plan, Figs. 7 and 8 and indicated by letter *h*. Two or more concentric circles of these segments are thus put down, either by means of a diving bell or other hydro-pneumatic apparatus and it is apparent these segments when undermined by the action of the current will descend gradually and thereby inclose and protect the surface which they respectively cover. It is assumed also that these segments will so deflect the tidal current from the main body of the work, about its base, that no process of undermining can take place, though as an additional security the spandrels between the convex surfaces of these segments should be filled in with clay or stone as soon as the bed plates are fixed in position. Another form of these segments for protecting the bottom from abrasion is shown at Fig. 16, which it is proposed to cast as a hollow box, whose transverse section should be triangular as expressed in the drawing, with hinge bosses for shackling the pairs together. This form would more effectually exclude the water from acting upon the surface inclosed by these segments. The application of this mode of forming the shells of piers, breakwaters, &c., where the plan is rectilinear instead of circular must be obvious without details. The tubular pieces fitting on to the iron piles, where an angle is required, is shown at Fig. 10.

The drawing annexed exhibits the following, viz: Fig. 1, geometrical elevation of a circular base composed of wrought iron piles *a* and cast iron bed plates *d* tubular grooved

pieces of cast iron *b*, and panels *c* of cast iron; Fig. 2, horizontal projection of a portion of Fig. 1, and in which the same letters apply to same parts in each figure; Figs. 3 and 4, end view and plan of bed sockets or plates, *a* show the position of the wrought iron pile, *b* the socket for the tubular castings *b*, *c*, the socket for the lower edge of the panels *c*, *d* the upper and plane surfaces of the bed plate; Fig. 5, horizontal section of one of the tubular castings, *p*, *p* projections to form a groove and joint for panels, *q* space occupied by edges of panels, *o* exterior surface - segment of a cylinder; Fig. 7, *g* section of segmental pieces to protect bottom, *h* hinge boss; Fig. 8, two concentric circles of Fig. 7 in plan showing the relative position of the segments and the main body of the work, Fig. 2; Fig. 10, tubular casting for angular structures; Fig. 16, angular form for the segmental pieces or boxes to protect the bottom.

What I claim as my invention and desire to secure by Letters Patent is—

1. The bed pieces and tubular pieces with lateral projections Figs. 3, 4 and 5, as used in combination with the iron piles aforesaid.

2. Also the method of protecting the bottom from abrasion, by means of the covering thereof with the segments or triangular boxes aforesaid expressed by Figs. 7, 8, and 16.

3. Also the combination of all these parts for the obtainment of permanent foundations in deep water for the support of hydraulic structures.

I. W. P. LEWIS.

Witnesses:
THOS. P. JONES,
WM. P. ELLIOT.