C. C. CONKLING.

CAISSON CONSTRUCTION.

APPLICATION FILED FEB. 23, 1912.

1,071,985.

Patented Sept. 2, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

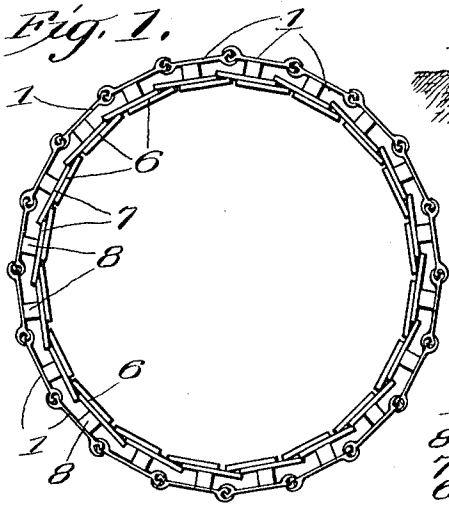


Fig. 2.

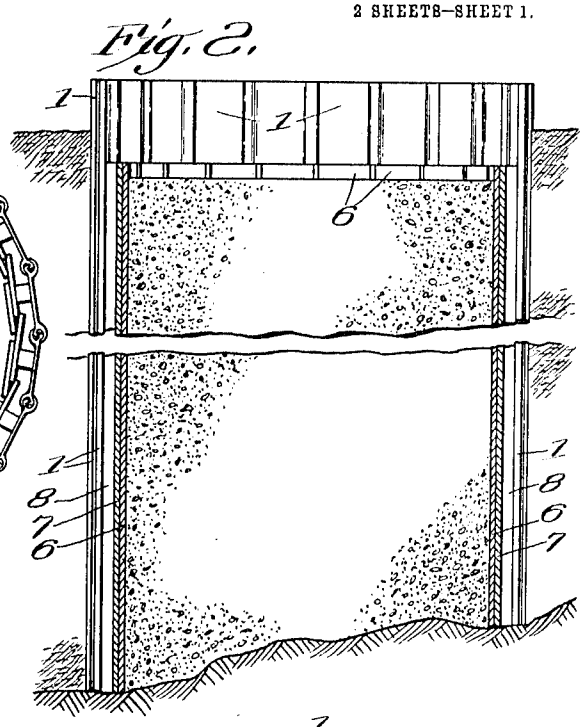


Fig. 3.

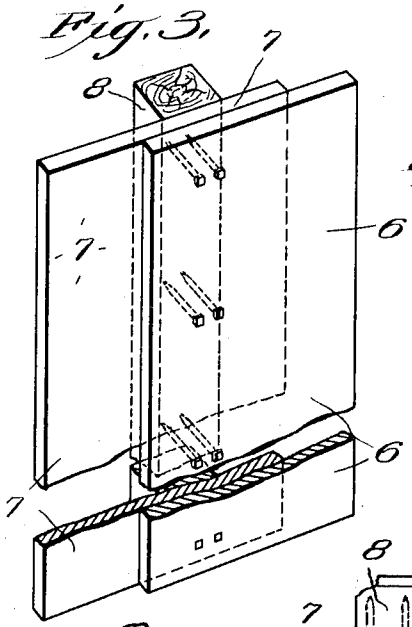
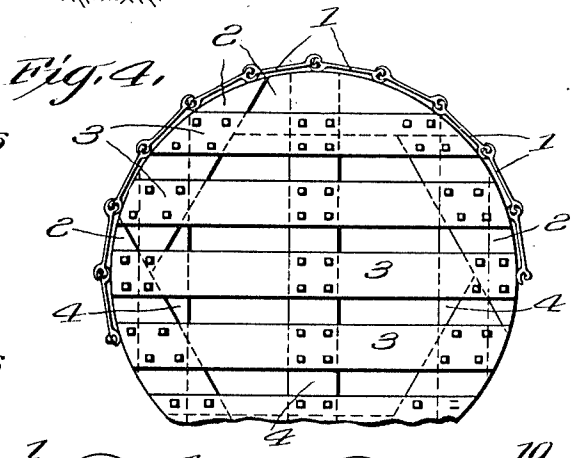


Fig. 4.



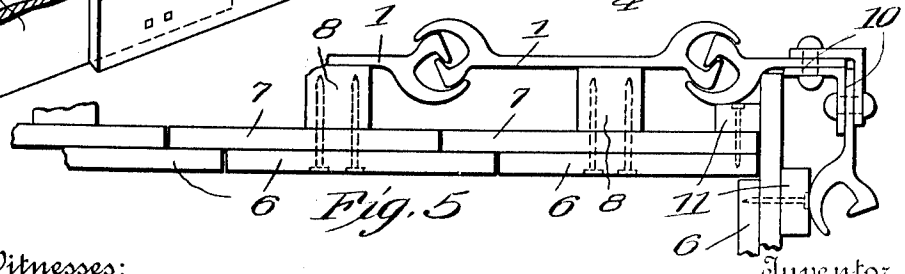


Fig. 5

Witnesses:

J. R. Millward

M. L. Breslin

Inventor

Cloud C. Conkling,

By his Attorney

Alfred Wilkinson

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

C. C. CONKLING.

CAISSON CONSTRUCTION.

APPLICATION FILED FEB. 23, 1912.

1,071,985.

Patented Sept. 2, 1913.

2 SHEETS—SHEET 2.

Fig. 6.

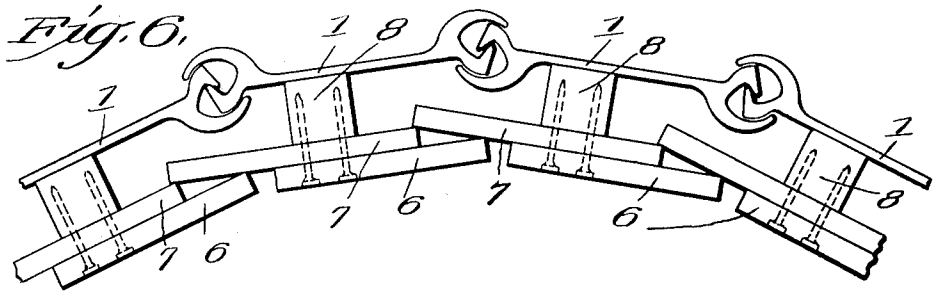


Fig. 7.

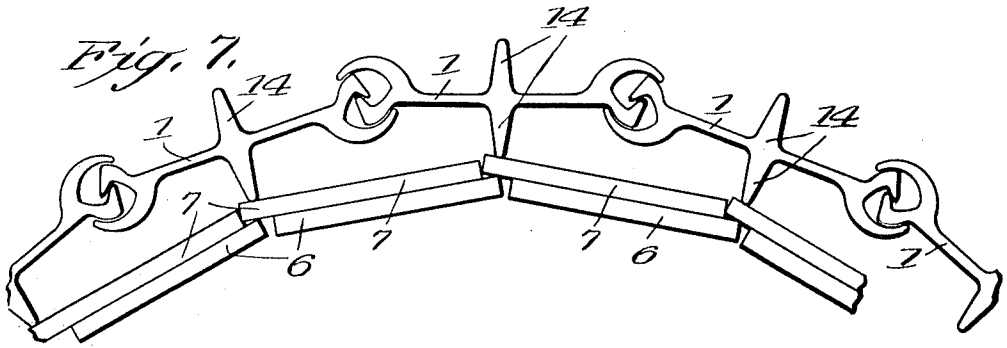
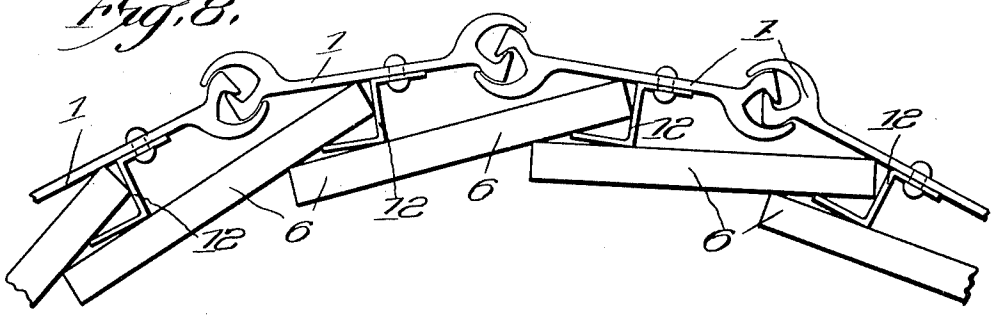


Fig. 8.



Witnesses:
J. F. Millwards
M. L. Breslin

Inventor
Cloud C. Conkling,
By his Attorney
Alfred Wilkinson

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CLOUD CLIFFORD CONKLING, OF BUFFALO, NEW YORK, ASSIGNOR TO LACKAWANNA STEEL COMPANY, OF LACKAWANNA, NEW YORK, A CORPORATION OF NEW YORK.

CAISSON CONSTRUCTION.

1,071,985. Specification of Letters Patent. Patented Sept. 2, 1913.

Application filed February 23, 1912. Serial No. 679,416.

To all whom it may concern:

Be it known that I, CLOUD CLIFFORD CONKLING, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Caisson Construction, of which the following is a specification.

My invention relates to metal caissons for use in submarine work and in the construction of piers, foundations, &c., and consists in a new method of constructing such caissons, whereby they may be made of steel sheet-piling more conveniently, accurately and economically than heretofore and the friction to be overcome in sinking the caisson is largely reduced, and in a new interlocking lining for the caisson, made of wooden planking or other suitable material, to prevent contact and bonding of the concrete with the steel, whereby it is made possible to remove and save the steel sheet-pile sections when the concrete has hardened. Heretofore such caissons have commonly been made of rigid steel, that is of plates riveted together to form a shell, or open box, of cylindrical, or rectangular, form, which is then forced down gradually as a unit to bed rock. The disadvantages of such caissons are the great friction and power required for driving, for the friction increases directly both with the diameter and the length of the shell; the shell can only be sunk to the highest point of the bed-rock; the excavation within must be carried on simultaneously with the driving of the shell, for both the outside and inside friction rapidly increase, and therefore the resistance must be eliminated as far as possible by keeping the inside excavation at, or below, the bottom or cutting edge; the riveted steel shell cannot be withdrawn after the pier is completed, but must be left permanently in place, so that the value of the steel in such a shell is lost and must be added as an increase to the cost of the foundations.

In my construction the caisson is made of steel sheet-piling, in which each section of comparatively narrow width may be driven independently down to bed-rock, or other suitable material, at varying depths and thus all the driving power concentrated on each individual section; simultaneous excavation within is not necessary; by use of a wooden lining as described herein the steel sections may be used as an indirect form for the concrete so that they may be pulled, when the concrete has hardened, thus saving the value of the steel.

By my method, a shallow trench or pit is excavated at the surface, of a few feet in depth and of the form desired for the caisson; the steel piling is then set up in this excavation, with the various sections interlocked, and a complete closure made. When necessary, a wooden templet, or form, can be laid in correct position in the bottom of the excavation to act as a guide and to insure perfect form in the caisson. Each pile section is then driven independently to bed-rock, after which the remaining excavation can be begun and completed in a continuous operation. Evidently it is not necessary to drive each section continuously home to bed-rock, for, if more convenient, each may be driven a certain distance, so that the whole structure will go down step by step, but this is but a trifling variation in procedure for it involves the independent driving of each section.

My invention will be understood by reference to the drawing herewith in which the same reference numerals indicate the same parts in all the figures.

Figures 1 and 2 show respectively in plan and in vertical section a circular caisson made and lined according to my invention. Fig. 3 is an isometric view of one unit of the wooden lining. Fig. 4 illustrates in plan the use of the wooden form to guide the driving. Figs. 5 and 6 are enlarged fragmental plan views showing the preferred construction of lining, respectively in a straight wall and a curved wall, caisson. Figs. 7 and 8 are similar views showing modified forms thereof.

In the figures 1 indicates the sheet piling sections of any suitable form of which the required number are driven with their interlocking elements in engagement to form a caisson of the desired size and shape. These sections are each driven home separately by the pile-driver and may be handled in any convenient way, but I recommend for many locations the method indicated in Fig. 4 where is indicated a wooden form of the exact diameter of the caisson. A small trench is dug around this, a foot

or two deep, to receive the ends of the sections, which are then driven home to bed rock, the form, or templet, acting as a guide to preserve correct alinement. The form is then removed and all excavation within the wall so formed is done continuously. In Fig. 4, 2 indicates the segmental boards forming the outline of the templet connected by the two sets of cross braces 3 and 4.

It will be understood that where the concrete is deposited in a steel caisson, using the latter as a form, and the concrete comes in direct contact with the steel, the fluid matrix of the concrete will enter the interlocking joints more or less, and, both at the joints and along the entire inside surface of the steel, the concrete will adhere, preventing the steel sections from being withdrawn later. Therefore to overcome this I have invented a supplementary lining of which suitable forms are shown in the drawing.

To reduce the friction the lining boards should not set flat against the steel sections but should be maintained by suitable supports out of contact therewith or should engage therewith only at a limited number of points. To that end I construct the lining as best shown in Figs. 1, 3 and 5. An inner board 6 and an outer 7 are spiked to a block or stud 8 to form a lining unit, with the edge of the inner extending outwardly on one side and the edge of the outer outwardly on the other, to interlock with the adjacent units as shown. These units, during or after interior excavation, are assembled on the inside of the caisson, tier by tier, with the blocks set against the inner surface of the steel and with their edges overlapping as shown. Thus the lining is locked in position and is self sustained; only the blocks come in contact with the steel sections, reducing the friction when pulling to a minimum; broken joints are formed in the lining, so there is little danger of the cement mortar leaking through and coming in contact with the steel, and, if any does leak, there will be contact to such a small extent as to not form any considerable adhesion or mechanical bond with the steel; thereby the function of the lining, to reduce such bonding and to make possible the withdrawal of the steel, is subserved to the fullest.

In Fig. 5 a rectangular caisson is illustrated with one unit at each corner specially formed as shown. One end is square and a supplementary block 11 is provided to engage with the piling interlocks of the corner piece 10.

In Fig. 8 is shown a single lining of planks without blocks. Angles 12 are riveted to the steel sections at intervals whereby one end of each board is held in position and the other end maintained out of engagement with the steel and overlapping the next board. Each board is in contact with the steel sections at such points only. But I do not consider this form desirable on account of the expense of fabricating.

The form of lining shown in Fig. 7 is desirable, where the stronger reinforced steel sections are used provided with the middle flanges 14—14. Here the blocks 8 are omitted for their function is subserved by the steel flanges. Preferably the units, composed only of the two planks spiked together as shown, are arranged with their ends resting on the flanges, and overlapping as shown.

By the use of the steel sections, each can be driven home independently and therefore easily and conveniently and with less friction, and each can be driven home independently to bed-rock so that the bottom of the caisson conforms thereto as shown in Fig. 2. This adds to the strength and water-tightness. By the use of the lining the concrete of the foundation is kept from engagement with the steel sections so that after the work is finished, the sections may be pulled easily, in most cases practically uninjured.

The advantages of ease in construction and driving home to bed-rock are obvious, but, on account of the expense of the steel, sheet piling could not be used in most places as a form for permanent concrete foundations unless it be withdrawn for future use or sale, and it could not be withdrawn unless there were some convenient means for preventing contact of the concrete and the steel. The cost is thus much less than of steel-plate rigid cylinders which must be left in place, not to mention again the other advantages.

The use of the form or templet is not required but the excavation may proceed as the sections are driven. When the depth of the foundation is such that the caisson will require interior bracing, this can be installed in the usual manner by use of waling timbers and struts and the wooden lining placed between the waling timbers and the caisson wall of steel sheet piling and carried down in sections from the top as the excavation proceeds.

While the lining may be made of any suitable material, yet commonly the units will be made of boards of any suitable width such as twelve inches, and could be safely used in maximum lengths of twelve to sixteen feet, or made even longer by splicing. In deeper work additional sets or tiers of lining units would be used to extend to the full depth of the excavation.

Having thus described my invention, I claim,

1. The herein described caisson for concrete structures, comprising a wall of steel sheet-piling sections, and a lining of planking for

the wall, said lining being in engagement with the steel at small and separate points of contact only.

2. In a caisson for concrete foundations a series of interlocking steel sheet-piling sections forming a continuous closed wall and a continuous lining therefor comprising a series of wooden units arranged circumferentially with one vertical edge of each unit overlapping the edge of the adjacent unit and each unit being in engagement with only a small portion of its surface.

3. In a caisson for concrete foundations, a series of interlocking steel sheet piling sections arranged with their interlocking members in engagement to form the inclosure, and a continuous lining therefor comprising a series of wooden units arranged within the said wall of steel sections and in engagement therewith each unit overlapping the adjacent units and having a small portion only of its rear surface in engagement with the wall.

4. In a caisson for concrete formations, a series of interlocking steel sheet piling sections forming the caisson and a wooden lining therefor to separate the steel from the concrete, said lining consisting of a series of units each comprising two similar boards of equal length and width, secured together with one vertical edge of each board extending beyond the corresponding edge of the other, and a block secured to the back of the boards, said units being arranged to extend circumferentially around the interior of the caisson with the blocks only in engagement with the wall and the outer extending board of each unit overlapping the inner extending board of the next unit.

5. A wooden lining unit for steel sheet-piling caissons, comprising an inner and an outer board secured together and arranged with one vertical edge of each extending beyond the corresponding vertical edge of the other, and a block secured to the back of the boards.

6. The herein described method of constructing caissons for concrete foundations, which consists in making a shallow excavation of substantially the circumference of the caisson, setting on end in this excavation interlocking metal sheet-piling sections with their interlocking members in engagement throughout the perimeter of the caisson, driving each section separately and completing such independent driving till each section independently reaches suitable material, and, after all the sections are driven, beginning the excavation and excavating continuously till the bottom is reached, then depositing the concrete in the caisson.

7. The herein described method of constructing caissons for concrete foundations, which consists in making a shallow excavation of substantially the circumference of the caisson, setting on end in this excavation interlocking steel sheet piling sections with their interlocking members in engagement throughout the entire perimeter of the caisson, driving each section separately to complete the driving of all the sections, then beginning the excavation and excavating continuously till the bottom is reached, then placing a continuous lining of suitable rigid lining units within the caisson, depositing concrete within the caisson and permitting it to set, and finally withdrawing the steel sections.

8. In a caisson for concrete foundations, a series of interlocking, steel, sheet-piling sections forming the caisson and a wooden lining therefor to separate the steel from the concrete, said lining consisting of a series of units, each comprising two boards, having their vertical edges respectively overlapping each other at opposite ends to overlap the two adjacent units, and a block secured to the back of the boards to engage with the caisson wall, and to maintain the boards spaced therefrom, the superficial area of the block being much less than that of the boards.

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

CLOUD CLIFFORD CONKLING.

Witnesses:
EDWARD C. HARD,
A. L. MCGEE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."