J. F. CUSHING.

COFFERDAM CONSTRUCTION.

APPLICATION FILED AUG. 7, 1919.

1,437,044.

Patented Nov. 28, 1922.

2 SHEETS—SHEET 1.

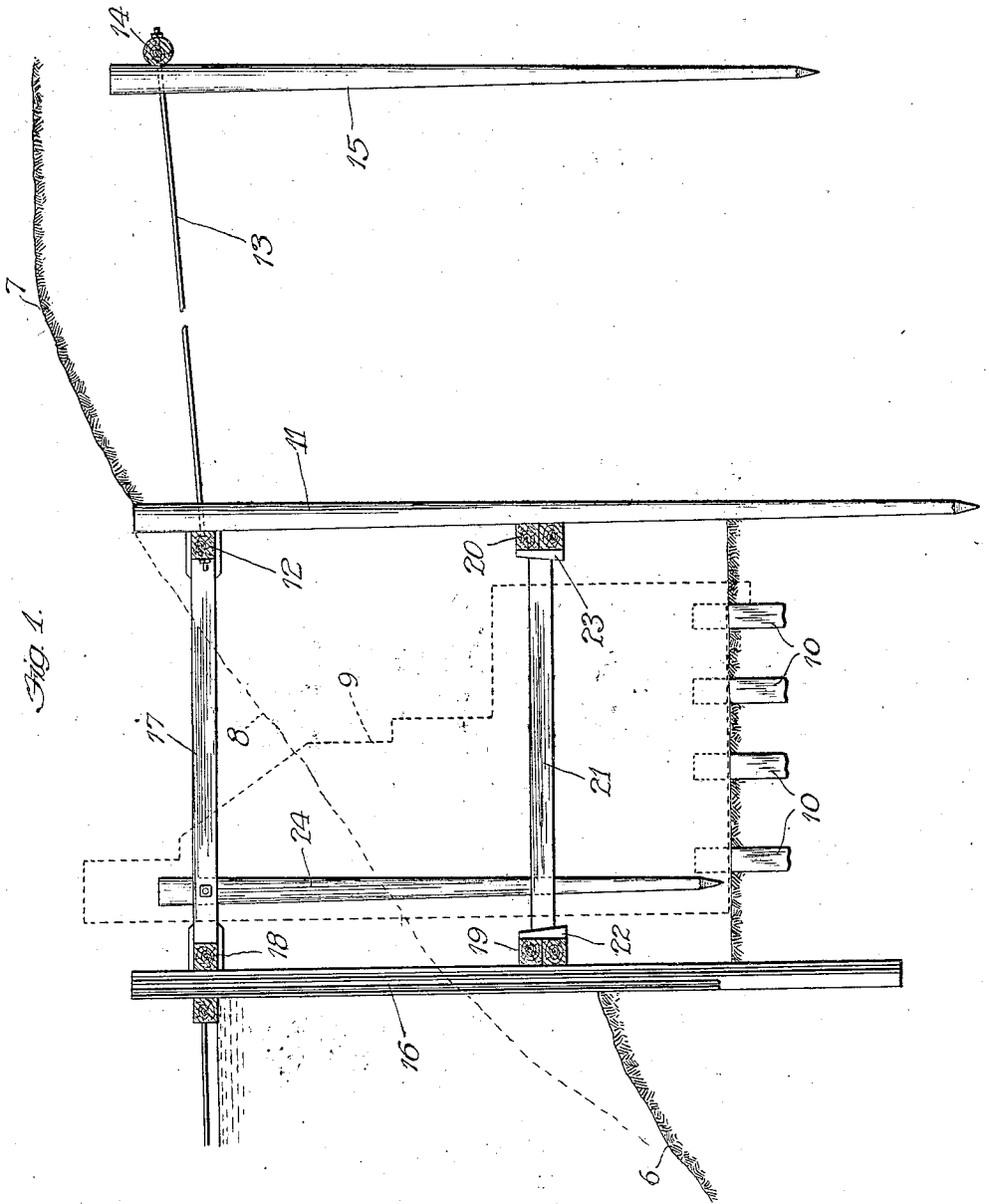


Fig. 1.

Witness
Martin H. Olsen

Inventor
John F. Cushing
By Richardson Gibbons Davis & Mason
Atty's

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2 SHEETS—SHEET 2.

Fig. 2.

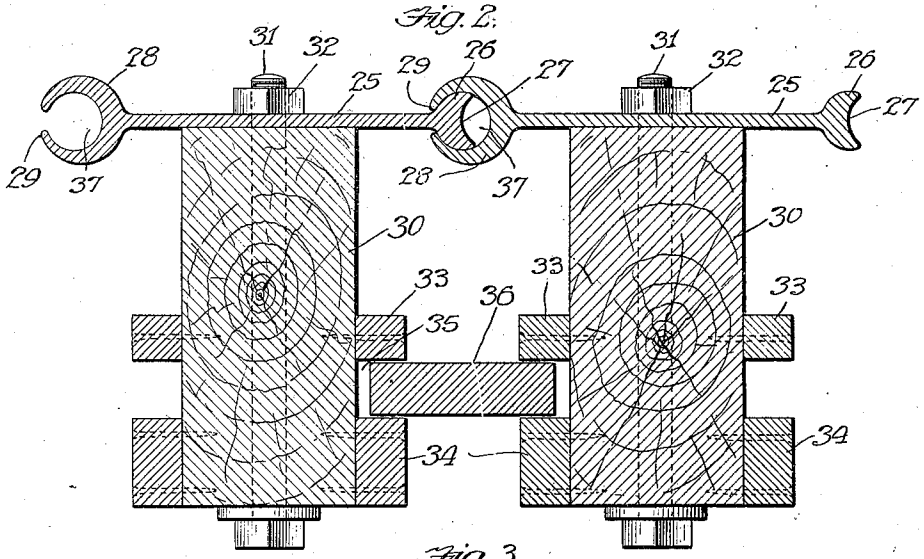


Fig. 3.

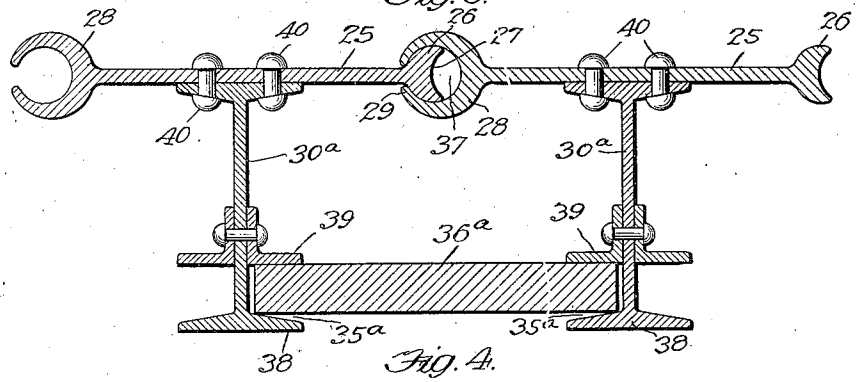
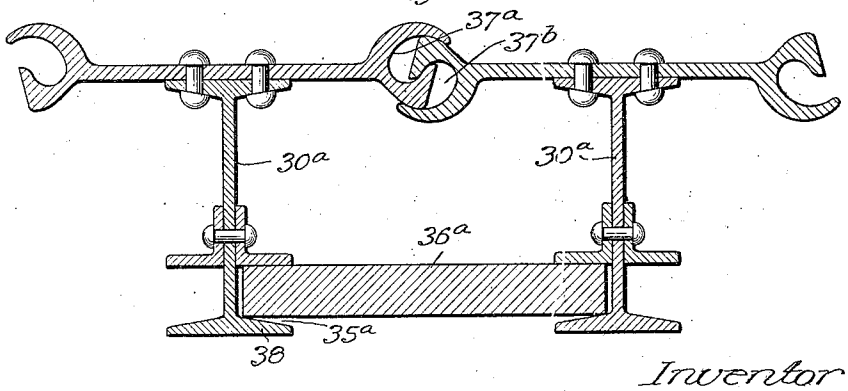


Fig. 4.



Witness

Martin H. Olsen.

Inventor

John F. Cushing

By Kleiser, Davis & Emery

Atty's

Patented Nov. 28, 1922. 1,437,044

UNITED STATES PATENT OFFICE.

JOHN F. CUSHING, OF CHICAGO, ILLINOIS, ASSIGNOR TO GREAT LAKES DREDGE & DOCK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

COFFERDAM CONSTRUCTION.

Application filed August 7, 1919. Serial No. 315,843.

To all whom it may concern:

Be it known that I, JOHN F. CUSHING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cofferdam Constructions, of which the following is a specification.

In accordance with the present practice coffer-dams are either of the puddle wall or single dam construction. The former are considered the safer but more expensive. They are commonly constructed of a pair of walls of sheeting, the space between which walls is filled with clay. The latter ordinarily are composed of vertical strips of metal plate with interlocking edges, said strips being driven into position by means of a pile driver or the like. It is impracticable under service conditions to make all of the joints between the adjacent strips of sheeting water-tight, and therefore leakage occurs, and as there is no means for isolating the several joints it is impossible to locate the defectives. Furthermore the sheeting plates being comparatively thin are liable to buckle more or less, particularly during transportation and when being driven, which increases the liability of the joints to leakage and also shortens the effective life of the plates affected; and on account of the lack of stiffness it is necessary to submerge the bracing inside the dam before it can be pumped out. It is the purpose of my invention to obviate the above conditions and to provide a single wall construction having substantially the advantages of both types and certain additional advantages which will be hereinafter pointed out.

In the accompanying drawings I have shown several preferred forms of the invention and described the same in the following specification. It is to be understood, however, that the specific disclosure is for the purpose of exemplification only, and that the scope of the invention is defined in the following claims in which I have endeavored to distinguish it from the prior art so far as known to me without, however, relinquishing or abandoning any portion or feature thereof.

Referring to the drawings Fig. 1 represents in vertical transverse section a cofferdam construction embodying my invention; Fig. 2 a horizontal section through a pair of adjacent sheeting plates to which my invention in one of its forms is applied; and Figs. 3 and 4 are similar views of modified forms of the invention.

In Fig. 1 for the purpose of illustrating the use of my invention I have shown a practical application thereof to the construction of a dock, and, except in the respects hereinafter pointed out, the construction is a not uncommon engineering work. In this figure the dotted line 8 indicates the approximate line of the bank before operations are begun and the full lines 6 and 7 the bottom of the body of water and the bank adjacent the construction. A closely set row of piles 11 is driven in on the land side along the line of the proposed excavation and is anchored by anchor piles 15, a wale 12 on the face of the row of piles being connected to a sill 14 beyond the anchor piles by tie-rods 13. The combined sheeting 16, to which more particularly my invention relates and which will be described in detail later, is then driven in along the line which is to constitute the water limit of the proposed excavation. A wale 18 is placed against the inner face of the sheeting and connected by a brace 17 to the wale 12 to resist the water pressure when the cofferdam is pumped out. The piles 24 may be driven in to support the braces 17 and bolted to the latter. After the sheeting is in place the cofferdam is pumped out and excavated to the required depth and braces 21 added at required intervals bearing against corbels 22, 23 upon wales 19, 20, located against the sheeting and row of piles respectively. At 9, as shown in dotted lines, is the proposed dock construction and at 10 the supporting piles therefor.

The above described construction forms no part of my actual invention but is described for the purpose of exemplifying one of the uses to which the latter may be put.

Referring now to Fig. 2, that specific form of the invention illustrated in Fig. 1 is shown in detail. The sheeting strips are illustrated at 25, and in the particular form chosen for illustration in this connection each of said strips is formed at one edge with a relatively small partially cylindrical bead 26 having a concave edge 27, and at the other edge with a larger bead 28 also partially cylindrical and hollow, the hollow being of a diameter slightly greater than that of the bead 26. The edges 29 of

the bead approach but are spaced from each other so that the smaller bead of the next adjacent sheeting strip may be inserted in the cavity thereof to form an interlocking joint. There is nothing new per se in this form of sheeting strip and while it is very well adapted for the purpose of my invention it is only one of a number of commercial forms of sheeting strip which may be employed for this purpose.

In the particular form of the invention illustrated in Fig. 2 a beam or timber 30 is secured longitudinally of the strip and about midway between its edges by bolts 31 and nuts 32. These beams 30 serve to give rigidity to the respective sheeting strips and prevent the buckling thereof and are preferably secured thereto before the strips are subjected to much handling in order to prevent the latter buckling during manipulation. Near the outer edges of the timbers or beams, strips 33, 34 are secured longitudinally of the respective beams by nailing thereto, such strips being spaced sufficiently from each other to leave therebetween a relatively narrow channel 35. The channels 35 on the adjacent beams form guideways for closure members 36, which are preferably inserted therein after the sheeting strips with their attached stiffening members or beams have been driven in place. Said closure members or slides 36 form with the respective adjacent stiffening or partition members 30 closed compartments about or at one side of each of the respective joints between the edges of the sheeting strips. The compartments or timbers so formed are preferably filled with some granular or fibrous material such as ordinary street sweepings which I have found to be a cheap and efficient material for the purpose. It is to be understood that the sheeting strips or sheeting proper occupy the dry or land side of the cofferdam and the closure strips are at the water side thereof so that the pressure of the water tends to and does to some extent carry the finer particles and fibers from the compartment into the small stuffing box 37 formed by the mating beads of each adjacent pair of sheeting strips.

In the form of invention shown in Fig. 3 for the timbers or beams 30 are substituted metal I-beams 30^a and the guideways for the slides or closure members 36^a are formed between the outer or free flanges 38 of the respective I-beams and angle irons 39 which are riveted to the I-beams at a suitable distance from said flanges to form therewith pockets or guideways 35^a for the reception of the slides or closure members 36^a. In this construction the I-beams are riveted at 40 to the sheeting strips 25 which are shown as identical with the sheeting strips of that form of the invention shown in Fig. 2.

In the form of the invention shown in Fig. 4 the construction is identical with that of Fig. 3 except as to the interlocking flanges or beads of the sheeting strips which are here shown as of another known commercial form. The construction is so obvious from an inspection of Fig. 4 as to require no specific description. But it is to be noted that in this modification there are two stuffing boxes or chambers 37^a, 37^b which are as it were in series so that the leakage through one such chamber has to pass through the other.

In forming a cofferdam out of my improved combined sheeting the sheeting strips or elements with their attached stiffening ribs or members are driven into position in the usual manner with their edges interlocked. The slide strips or closure members are then dropped into the guideways, forming about each sheeting joint or, more correctly speaking, upon one side thereof a compartment whereby said joint is isolated from adjoining joints so far as the water pressure is concerned. The filling materials, street sweepings or the like, are then packed into the respective compartments and preferably tamped or otherwise compacted. There is no particular attempt to make the slides watertight in their respective grooves and hence the water pressure of the water outside the cofferdam is transmitted to that inside the compartment. It has been found impossible or impracticable under normal working conditions to make the joints between the abutting edges of the respective adjacent sheeting strips altogether watertight and therefore the fibers and more finely divided material in the packing is to a greater or less extent swept into the pocket or cavity 37 formed by the beading and serves to pack and fill up the joint toward the land or air side of the union. Thus sooner or later and doubtless with substantial aid from the rusting of the material the joint becomes choked and leakage is either eliminated or very greatly reduced.

From the above description it will be clear that my improved form of cofferdam combines the advantages of the prior art puddle wall dam with those of the single wall dam and has certain advantages peculiar to itself. The sheeting is more nearly watertight because the stiffening of the pieces of sheeting by the beams prevents their twisting and warping either prior to or during the driving operation and thereby causing faulty joints. Each joint is separately packed by the sweepings contained in the chamber on the water side of the joint so that the penetration of water into the joint tends to carry the packing material with it and fill the packing chamber formed in the edges of adjacent sheets. The sheeting is so stiffened that after the top bracing is put in the dam can be pumped out inside to a

considerable depth before the additional set of bracing is installed, thus reducing the amount of bracing. A considerable portion of the pressure under this construction is transmitted to the ground into which the sheeting is driven it being unnecessary to install the bracing under water. The installation can be much more conveniently and advantageously accomplished. The dam occupying less space than the puddle wall dam is less of an obstacle to navigation and may be installed where the wider type of dam is impossible. The dam is much less expensive to install and is more nearly watertight than the puddle wall dam heretofore employed. Furthermore because of the sectional construction of the dam any leakage may be readily located and remedied.

Of the forms of the invention shown each has its advantage depending, among other things, on the character of the ground in which the cofferdam is located. If the soil is somewhat loose the form of dam having the wooden beams is to be preferred as the latter, by displacement, tend to compact the ground into which they are driven. On the other hand in firmer soil the steel construction has the advantage that it is more readily driven.

I claim:

1. In a cofferdam construction, the combination of interlocking sheeting strips, stiffening members connected to the respective sheeting strips and arranged longitudinally thereof intermediate their edges, and closure members having sliding connection with the stiffening members arranged substantially parallel to but spaced from the sheeting strips and forming with said strips and stiffening members closed compartments individual to the respective joints between the strips.

2. In a cofferdam construction, sheeting strips having mating edges, stiffening members, extending longitudinally of the respective strips and projecting from corresponding faces thereof and closure strips having sliding engagement with said stiffening members near the edges thereof remote from the sheeting strips and forming with said stiffening members and sheeting strips compartments individual to the respective joints between the sheeting strips.

3. In a construction of the class described, a sheeting composed of strips having mating edges, stiffening members arranged longitudinally of the respective sheeting strips, slideways upon said stiffening members at a distance from the sheeting strips, and closure members held in the slideways and forming with the stiffening members and sheeting strips enclosed chambers about the respective joints between the sheeting strips.

4. In a construction of the class described, sheeting strips having interlocking edges, combined stiffening and partition members secured to the respective sheeting strips longitudinally thereof, flange members on said stiffening members at points remote from the sheeting strips, and closure members retained by said flanges and forming with the stiffening members and sheeting strips enclosed chambers individual to the respective joints between the sheeting strips.

5. In a construction of the class described, sheeting strips having interlocking edges, combined stiffening and partition members on the respective sheeting strips each comprising an I-beam and angle irons secured to the I-beams and forming with the flanges thereof ways for the reception of closure strips, and said closure strips in said ways.

JOHN F. CUSHING.