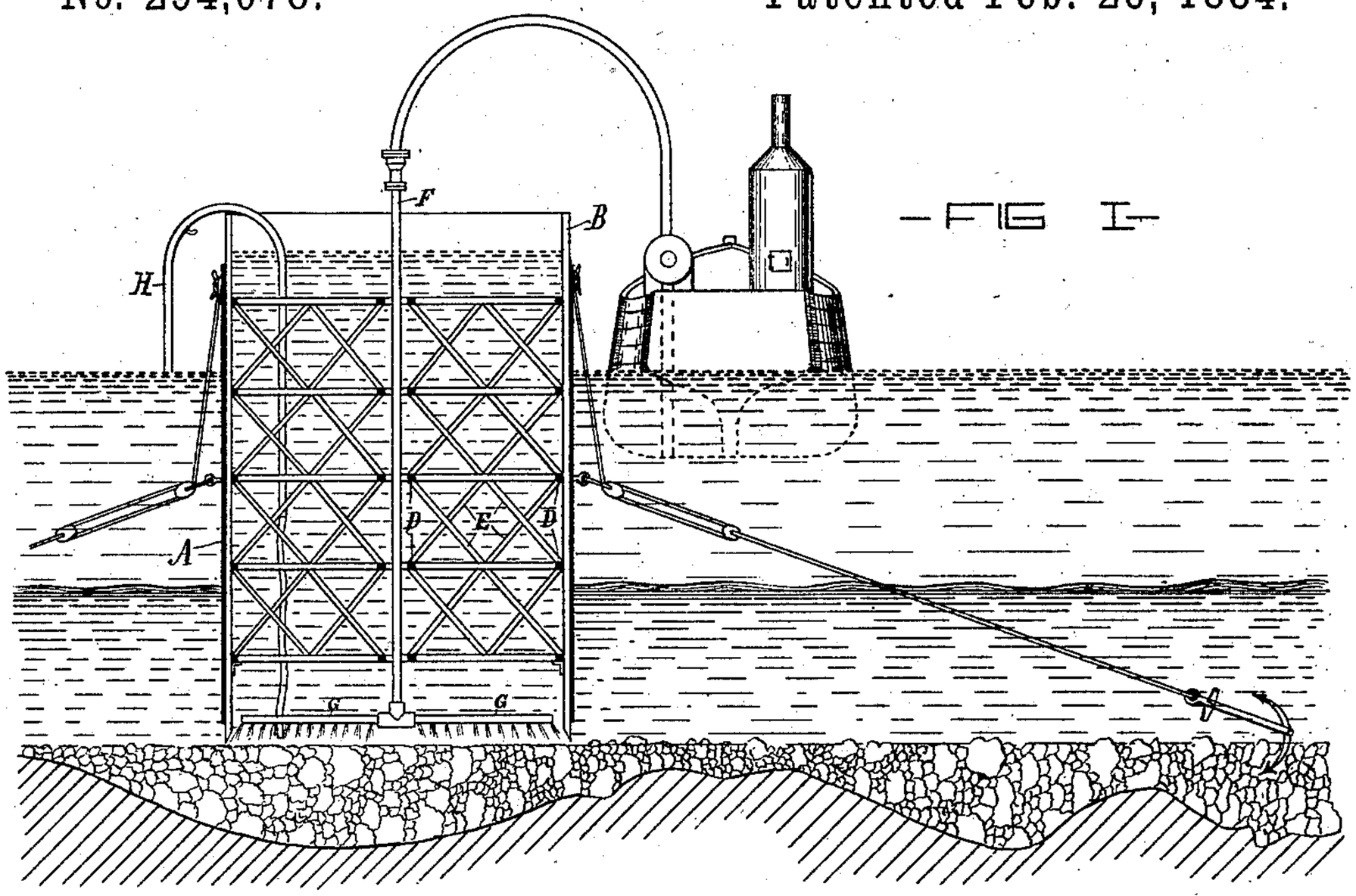
(No Model.) 2 Sheets—Sheet 1.

# J. E. ROBINSON.

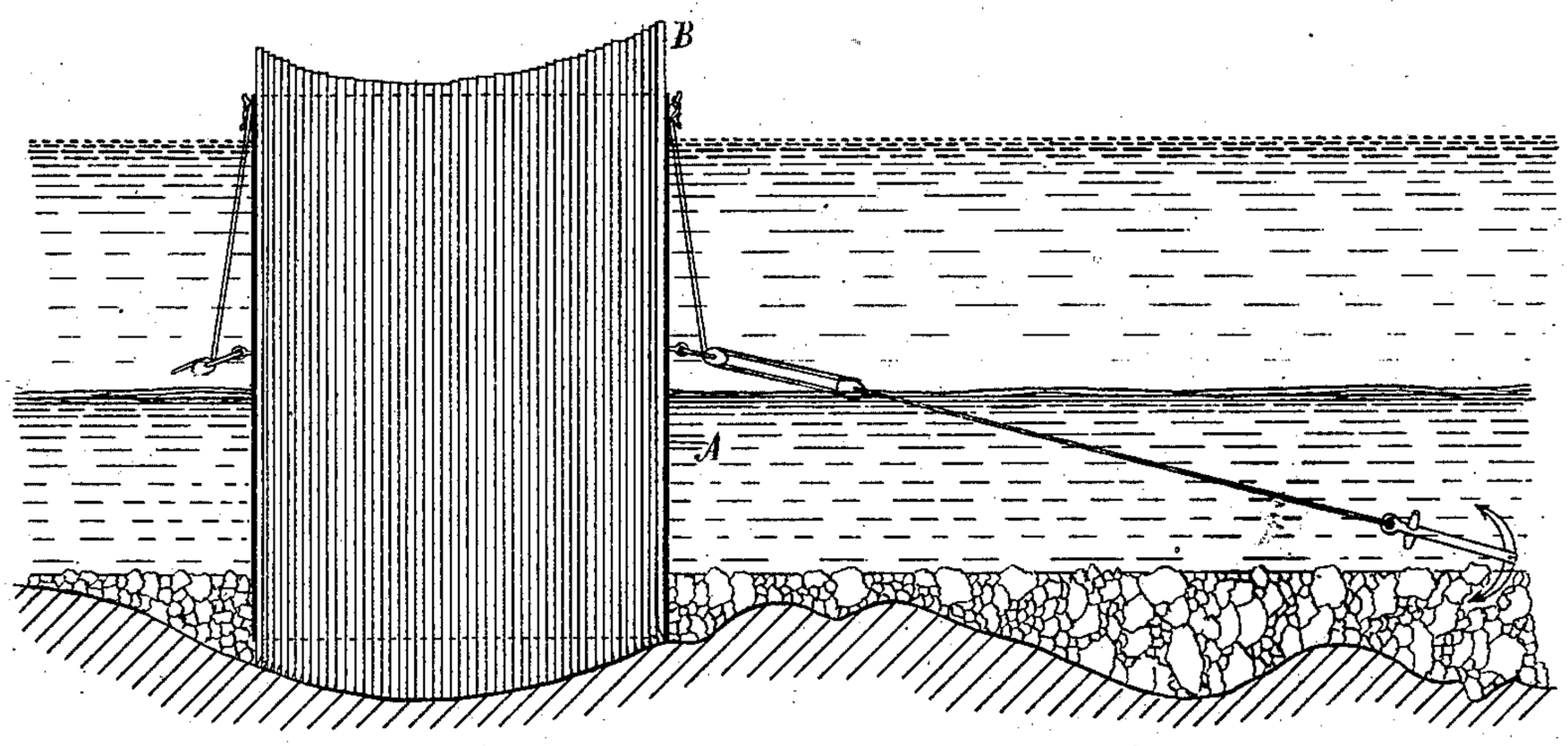
## CONSTRUCTION AND OPERATION OF CAISSONS.

No. 294,078. Patented Feb. 26, 1884.




—FIG I—

—FIG II—




—WITNESSES—

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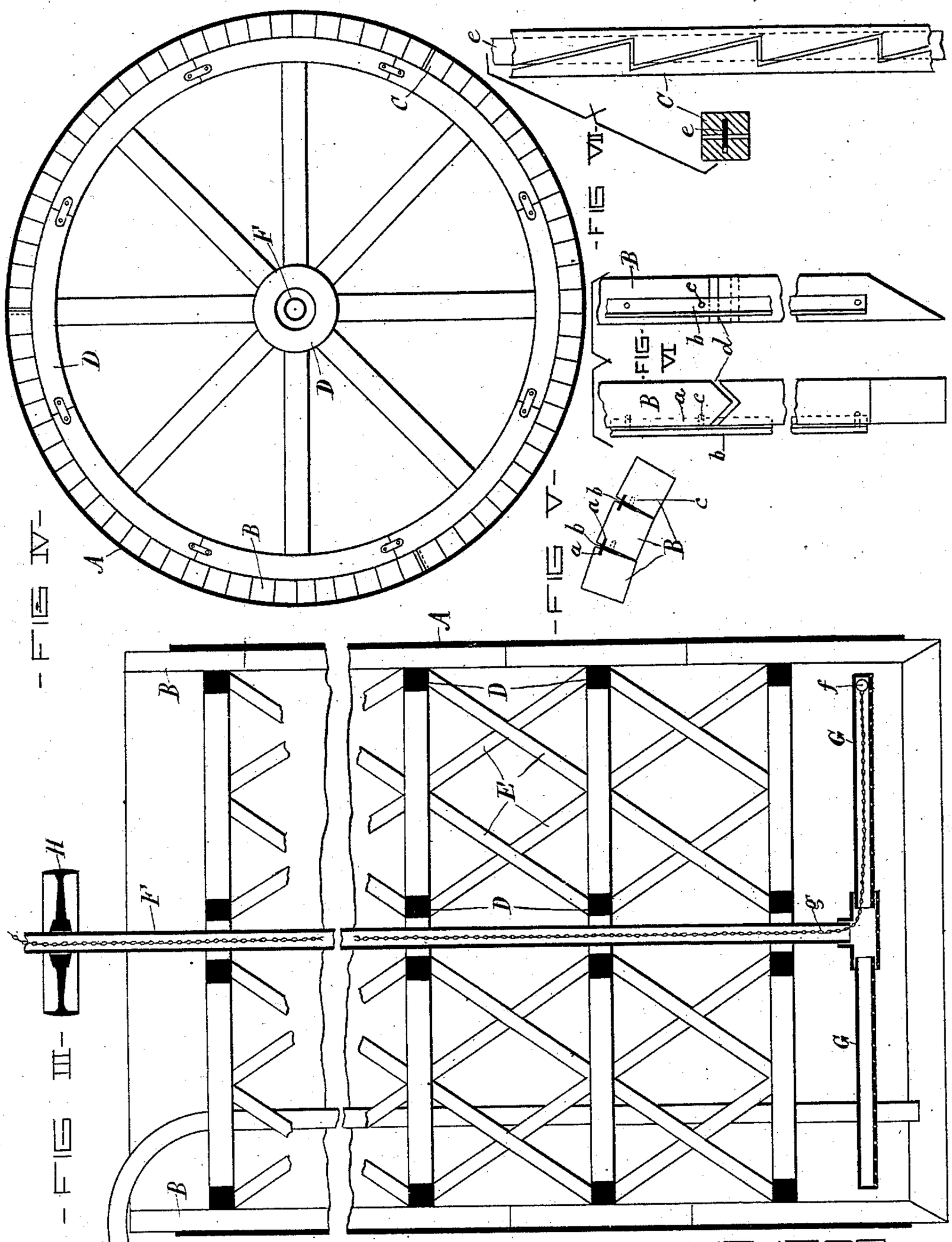


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# UNITED STATES PATENT OFFICE.

JOHN E. ROBINSON, OF BALTIMORE, MARYLAND.

## CONSTRUCTION AND OPERATION OF CAISSONS.

SPECIFICATION forming part of Letters Patent No. 294,078, dated February 26, 1884.

Application filed July 21, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN E. ROBINSON, of the city of Baltimore, and State of Maryland, have made certain Improvements in the Construction of Caissons, of which the following is a specification.

The first part of this invention relates to the construction of the caisson, and the second part to the method or process whereby mud and gravel are removed from the caisson, as will hereinafter fully appear.

In the description of the said invention which follows reference is made to the accompanying drawings, forming a part thereof, and in which—

Figure I is a view of the caisson in the bed of a river, and before it is in place. Fig. II shows the caisson resting on the rocky bed of the river. Figs. III and IV are respectively a vertical section and a plan of the improved caisson on an enlarged scale. Figs. V, VI, and VII are views of parts of the caisson still further enlarged.

Similar letters of reference indicate similar parts in all the views.

A is a sheet-iron cylinder forming the shell of the caisson. The cylinder is lined with wood staves B, which consist of logs, of preferably square or rectangular cross-section, placed around the shell, as shown in the drawings.

To avoid cutting the sides of the logs or staves so as to present radial lines, which operation would tend to reduce the value of the logs for other purposes after their removal from the caisson, I groove them longitudinally, and insert in the grooves, which are represented by *a*, T-bars *b*, as shown in Figs. V and VI. A T-bar *b*, is attached to one side only of each stave by means of a screw, *c*, and it will be seen that after the staves are in place, and before they are tightened within the cylinder A by means hereinafter described, any one or all of the said staves may be driven down independently of the cylinder, for a purpose hereinafter set forth.

In almost all cases a stave formed from a single log would not have sufficient length. I therefore construct staves of a series of logs united endwise, and in order that their sides or edges may be flush or on the same line, I make the end of one log V-shaped and notch the connecting-log, as shown at *d*, Fig. VI. The staves B are tightened in the cylinder A by means of wedge-logs C, three or four of which are employed, instead of the ordinary staves. These wedge-logs consist of two pieces of timber cut, as shown in Fig. VII, to form wedges.

It will be understood that by driving one section of the wedge-log independently of the other the size of the log is practically increased and tightens the whole series.

To prevent the two sections of the wedge-logs becoming displaced when in use, or when not driven tightly between the logs B, I groove them, and place within the groove a flat bar, *e*. (See Fig. VII.)

D D are circular braces to sustain the staves and the casing against the collapsing action of the water when the caisson is empty, and these braces are sustained by the diagonal braces E.

F is a revoluble pipe, extending through the bracing of the caisson to near its bottom, and it is provided with a cross-pipe, G, which is perforated at or near its under side. The vertical pipe is suitably supported in bearings, (not shown in the drawings,) and is rotated either by means of a belt and a pulley, H, (shown in Fig. III,) or it may be automatically revolved by the reaction of the jets of water discharged through the perforated bottom of the pipe.

To admit of the discharge of water from one arm only of the cross-pipe G, or a portion of the said pipe, I place in the said arm a ball-valve, *f*, and connect it by means of a chain, *g*, which is accessible from the upper part of the caisson. (See Fig. III.) By means of the chain *g* the ball *f* can be held at any point within the arm of the cross-pipe G, before alluded to, and all discharge of water at a point beyond the ball prevented. The discharge from one arm of the cross-pipe is necessary when a full rotation of the pipe produces an uneven surface and it is required to reduce a hard part of the river-bottom at one side of the caisson. This operation is accomplished by vibrating the discharge arm or branch of the cross-pipe over the parts to be removed. The vertical pipe F is connected by a piece of hose or a pipe to a pump, which may be located on

the bracing D, or on a lighter moored alongside of the caisson, as shown in Fig. I. The caisson is anchored over the spot where the pier is to be erected, as shown in Figs. I and II.

Parts of the invention not yet alluded to will be described and their uses fully set forth in the description of the operation of the invention which follows.

Supposing the caisson to be constructed and lowered into the mud in the river, water is forced in the caisson through the pipe F and its cross-branch G, and in the discharge the mud is stirred up. The height of water in the caisson is elevated above the level of the water in the river. Consequently there is an internal pressure in the caisson. By maintaining a head of water in the caisson there is a natural outward flow of water and mud underneath the staves, which displaces the mud around the outside and facilitates the lowering of the apparatus. The discharge of the mud and water is effected by another pump and pipe discharging overboard, or it can be accomplished by merely employing a siphon, H, as shown in Fig. I. When the bottom of the caisson reaches the gravel or the rock bottom of the river, the staves B are driven down independently until their pointed ends come in contact with the rock. By this independent movement of the staves the lower end of the caisson is made to conform to the contour of the rock, and a nearly water-tight joint produced. After the staves are driven down they are tightened by means of the wedge-logs, before described, and the water pumped out. The gravel is then removed, and any leaks caused by the staves not fitting accurately the surface of the rock are stopped by calking. The bracing or a portion of it is removed as the pier is built, and other bracing (not shown in the drawings) secured between the pier and the rims of the circular bracing, which are not removed.

It is found that caissons constructed according to my invention will require little or no weighting to carry them to the rock bottom, as the logs surrounded by the iron cylinder will have a greater specific gravity than the water. When the pier is built to a point above the water-line, the caisson is again filled with water to counterbalance the exterior pressure, and then lifted over the pier, when the bracing is replaced and the apparatus carried to the place where the next pier is to be built. The operation as before described is then repeated.

From the foregoing it will be understood that the logs and iron used in the construction of a caisson may be employed, after the completion of the pier, for other purposes, they being uninjured, except that the logs have grooves in which the T-bars were inserted. The actual expense of the erection of the piers is thus much reduced.

I claim as my invention—

1. A caisson which consists of an iron shell supported internally by staves arranged to form a complete cylinder, substantially as specified.

2. A caisson which consists of an iron shell supported by staves arranged to form a complete cylinder, and bracing, substantially as specified.

3. A caisson which consists of an iron cylinder supported by staves and tightening-logs, substantially as specified.

4. A caisson composed of an iron shell and supporting logs or staves arranged to form a complete internal cylinder, the said staves having pointed lower ends, substantially as and for the purpose specified.

5. In a caisson constructed as described, the staves separated by T-iron bars, substantially as specified.

6. The process of removing mud from a caisson, which consists in supplying the caisson with water to a height above the natural level, stirring up the mud at the bottom, and holding it in suspension in said supplied water and siphoning out the mixture, substantially as specified.

7. In combination with the vertical pipe F and the perforated cross-pipe G, the ball-valve *f*, and means for adjusting it within the said cross-pipe, substantially as specified.

JOHN E. ROBINSON.

Witnesses:
JOHN WILLIAMS,
EDWARD J. DIGGS.