(No Model.) 2 Sheets—Sheet 1.

E. G. HARRIS.

COFFER DAM.

No. 467,806. Patented Jan. 26, 1892.

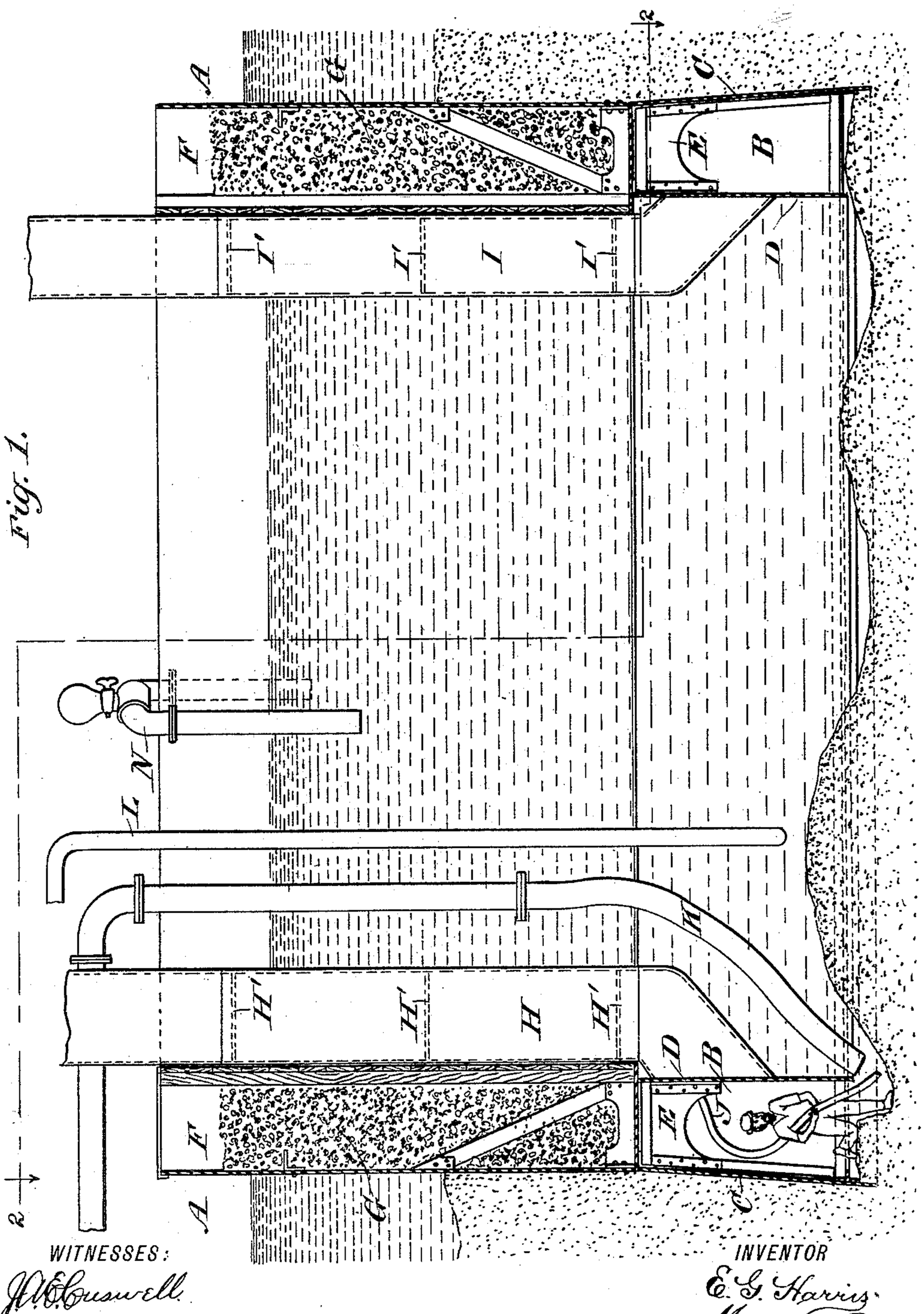

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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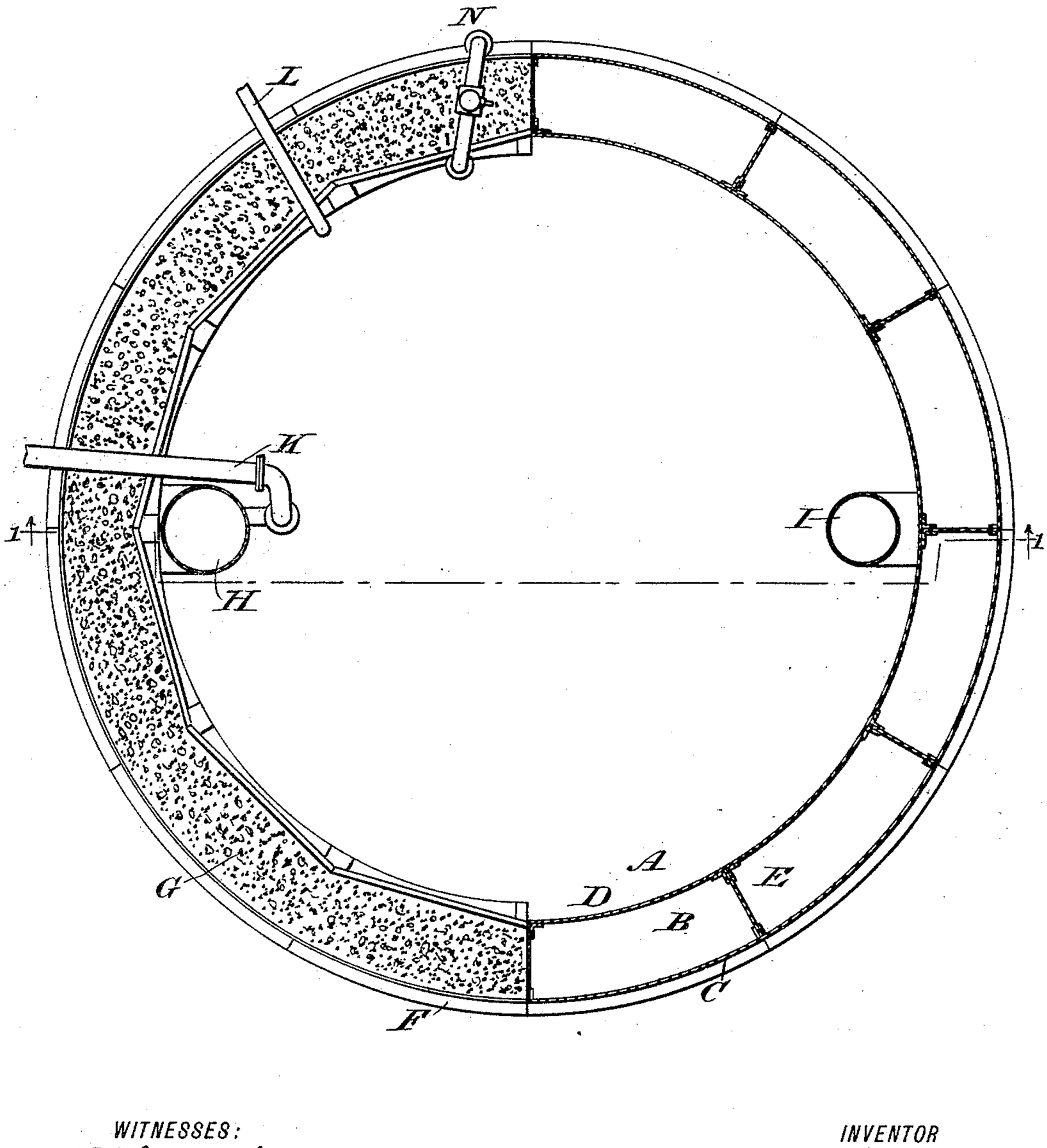
Fig. 2.



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UNITED STATES PATENT OFFICE.

ELMO G. HARRIS, OF LITTLE ROCK, ARKANSAS.

COFFER-DAM.

SPECIFICATION forming part of Letters Patent No. 467,806, dated January 26, 1892.

Application filed May 20, 1891. Serial No. 393,421. (No model.)

To all whom it may concern:

Be it known that I, ELMO G. HARRIS, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented certain new and useful Improvements in Coffer-Dams; and I do declare the following to be a full and clear description of the invention, such that others skilled in the art to which it appertains may be enabled to make and use the same.

The object of my invention is to provide an improved coffer-dam and an improved method of sinking the same, by which subaqueous structures may be more readily and more economically built, and by which existing submerged structures may be strengthened, enlarged, or removed where the common forms of coffer-dams and of pneumatic caissons will not apply. These objects I obtain by building a working chamber open at the bottom and air-tight elsewhere and continuous under and forming part of the walls of the coffer-dam, the whole inclosing an interior space open upward and downward.

The construction and mode of operation are illustrated in the accompanying drawings, which form part of this specification, wherein like letters indicate corresponding parts in the several views. These drawings illustrate a design for a coffer-dam of circular plan, constructed, principally, of wrought-iron; but be it understood that the improvement applies equally to structures of oblong and of angular plan, and that they may be constructed, principally, of wood.

Figure 1 is a sectional elevation on the line 1 1 of Fig. 2; and Fig. 2 is a plan, one-half of which is in section, on the line 2 2.

The improved coffer-dam A has an inner and an outer wall, in the lower part of which is the work-chamber B, which is continuous round under the whole structure of which it forms part. The chamber B is open at the bottom and air-tight elsewhere. The inner wall D of the chamber B stops at a less depth than the outer wall C. The work-chamber B must be large enough to allow workmen to operate within it, and it must be strengthened by suitable braces, cross-plates, &c., that it may be amply strong to withstand all strains that may come upon it. The roof of the chamber B will be designed to act as a floor, carrying the weight of the filling above, and as a horizontal truss or girder to resist pressure from without. The chamber F between the walls above the roof of the chamber B is designed to be filled with a good quality of concrete or other material G, by which the wall will be made strong, permanent, and watertight, and by which weight enough will be kept on the structure to force it down as the undermining in the chamber B proceeds. The walls of F are built up and filled between as the structure sinks downward.

All pipes necessary for operating in the chamber B pass down through the open interior and enter the chamber through the inner wall D. These would consist of a "man-shaft" H and supply-shaft I, each provided with suitable air-locks H′ and I′, an air-pipe L, by which air can be forced into the chamber, sand-pumps K, and one or more pipes J, through which water can be forced to be used in the form of a jet, as hereinafter described. These pipes can be detached and removed before finally refilling the coffer-dam. The siphon N is placed over the wall to keep the water-surface inside the structure approximately level with that outside, in order to keep all pressures nearly balanced. The inner wall of the portion F above the work-chamber may be cheaply constructed, as it is designed only to retain concrete in place until it sets.

Having thus described the construction and arrangement of parts of my invention, the mode of operation is as follows: If the coffer-dam is to incase some existing structure, the chamber B will be built on scaffolding round it. If it is to go down in open water, it can be built on shore and floated to place. In either case, having the chamber B over the proper place, the walls F are built up and concrete placed between them enough to sink the structure to the bottom. The weight can be adjusted by the amount of air kept in the chamber B. When the lower edges reach bottom, abundant weight is added to drive the edges into the soil, sand pumps or dredges are put to work, removing mud, sand, &c., from the interior, and air is forced into the chamber B enough to drive the water down to the

bottom of the interior wall D. Workmen then enter the chamber B and keep the two bottom edges clear of obstructions and shovel or jet the material from the chamber B under the inner wall D into the interior, where it can be taken out by sand-pumps, &c. Such obstructions as logs, bowlders, &c., can by a skillful use of the jet be driven into the interior, where they can be hoisted out. Workmen can grapple the nozzle of the sand-pump under the inner wall and so better direct its work. The water discharged by sand-pumps is replaced by water coming in through the siphon, thus keeping equal pressure inside and out and avoiding all great strains on the walls, and avoiding an inflow of mud, sand, &c., under the outside edge. But should the foot of the structure penetrate an impervious substance, such as clay, the siphon can be checked and the interior pumped empty. Should such a course be anticipated, the structure may have horizontal struts put across the open interior.

Such a construction and mode of operation as are above described will have advantages over present methods as follows: First, it combines the simplicity and economy of the open coffer-dam with the efficiency of the pneumatic caisson, and thereby secures economy of material in construction and economy of labor and time in putting down the structure; second, it makes possible the strengthening, enlarging, or removing of existing subaqueous structures where the common forms of coffer-dams and of pneumatic caissons would be alike ineffective; third, by it it is possible to sink great wells through saturated material where obstructions are to be met; fourth; it presents the possibility of controlling the pressure in the working chamber by the height of water in the interior portion, and, fifth, it further affords the possibility of escape from the chamber B under the inner wall should all other means fail.

Having thus described the mode of construction and of operating my invention, I claim as new and desire to secure by Letters Patent—

1. A coffer-dam having at the bottom of its walls and forming a part thereof a continuous chamber open at the bottom into which air can be forced to drive down the water and wherein men can enter and operate, substantially as shown and described.

2. A coffer-dam having at the bottom of its walls and forming part thereof a continuous chamber open at the bottom and having its outer wall to reach to a greater depth than the inner wall and into which air can be forced to drive down the water and wherein men can enter and operate, substantially as shown and described.

ELMO G. HARRIS.

Witnesses:
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P. H. MILNER.