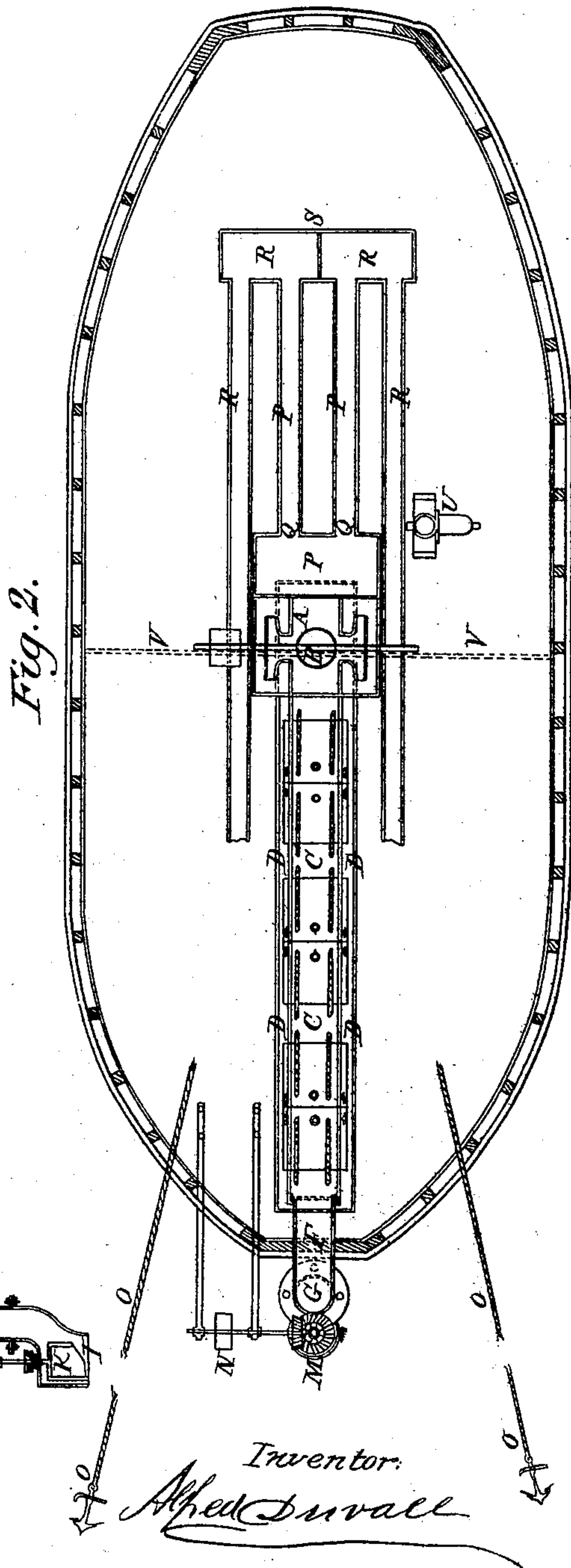
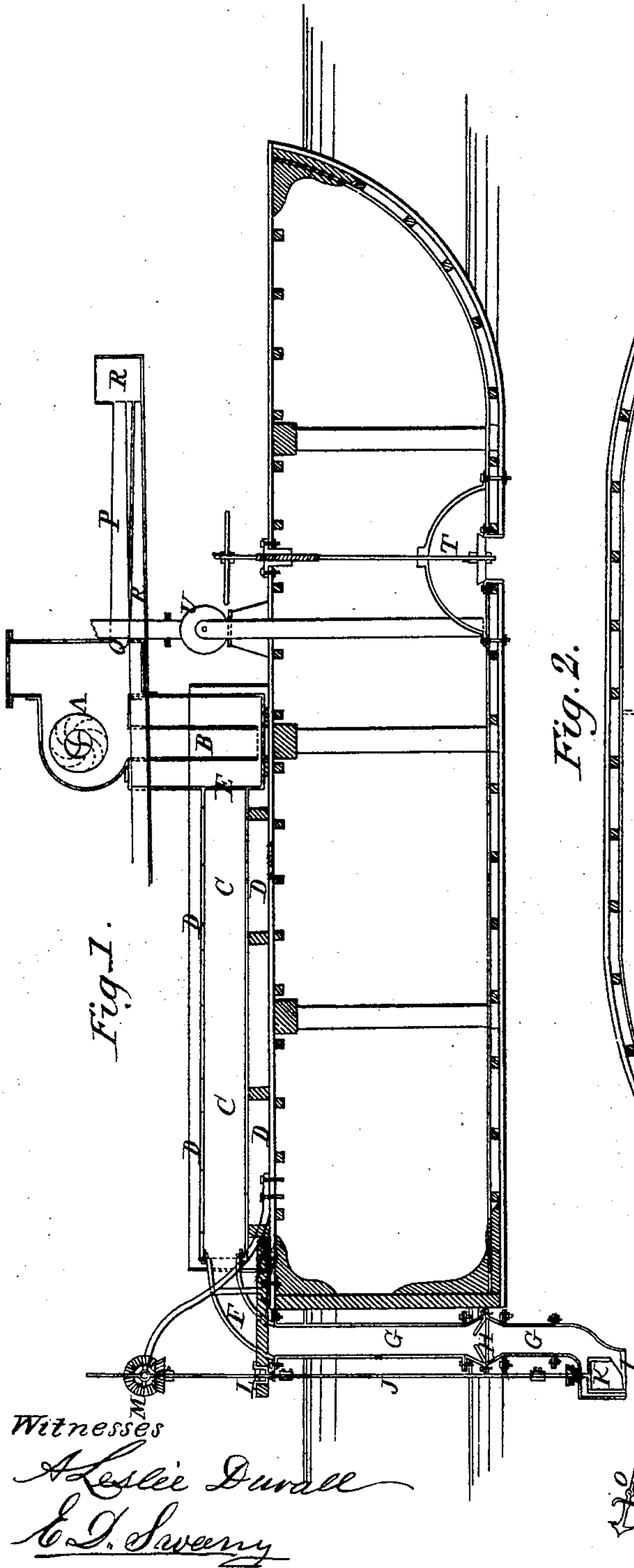


A. DUVALL.
EXCAVATING UNDER WATER.

No. 75,003.

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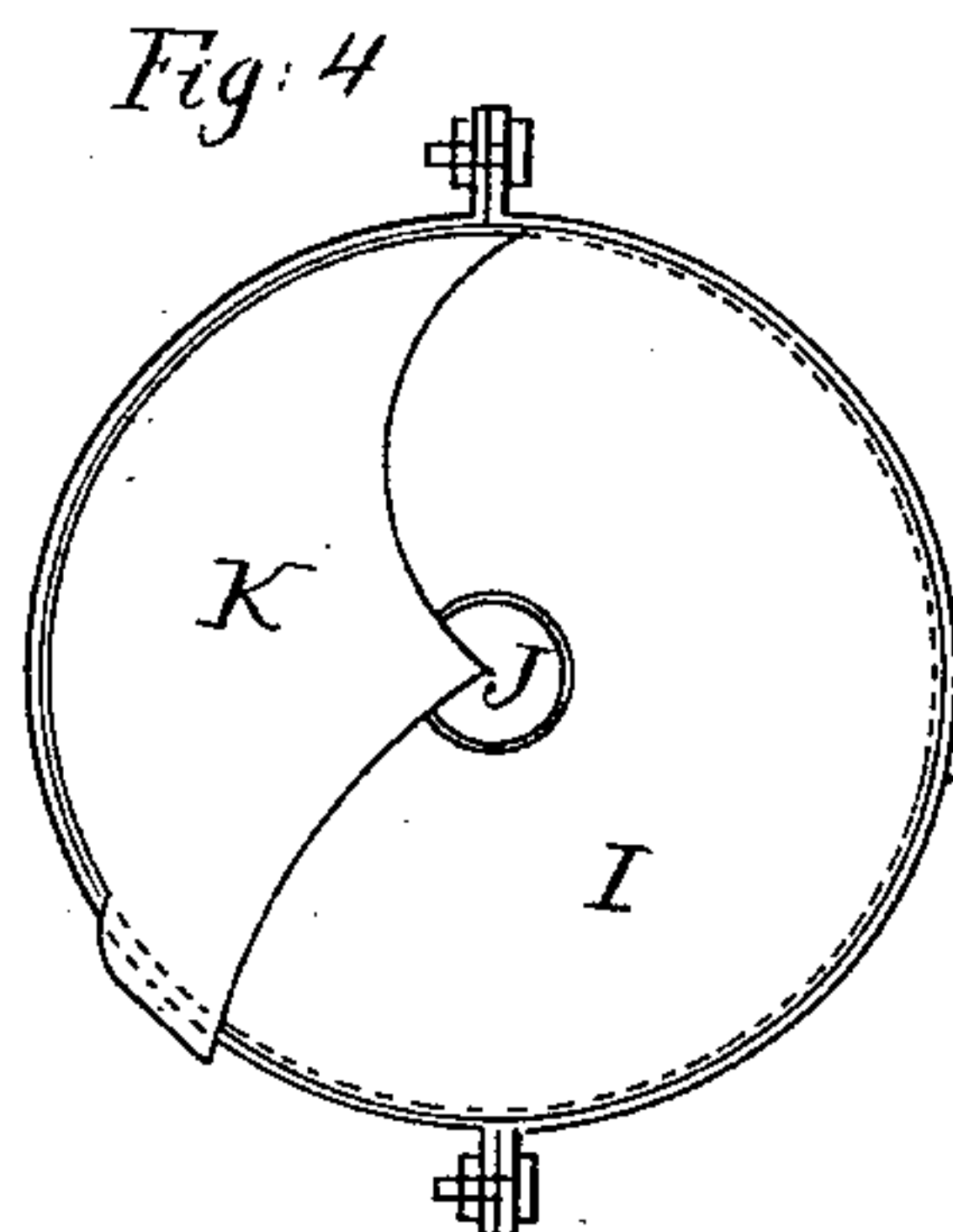
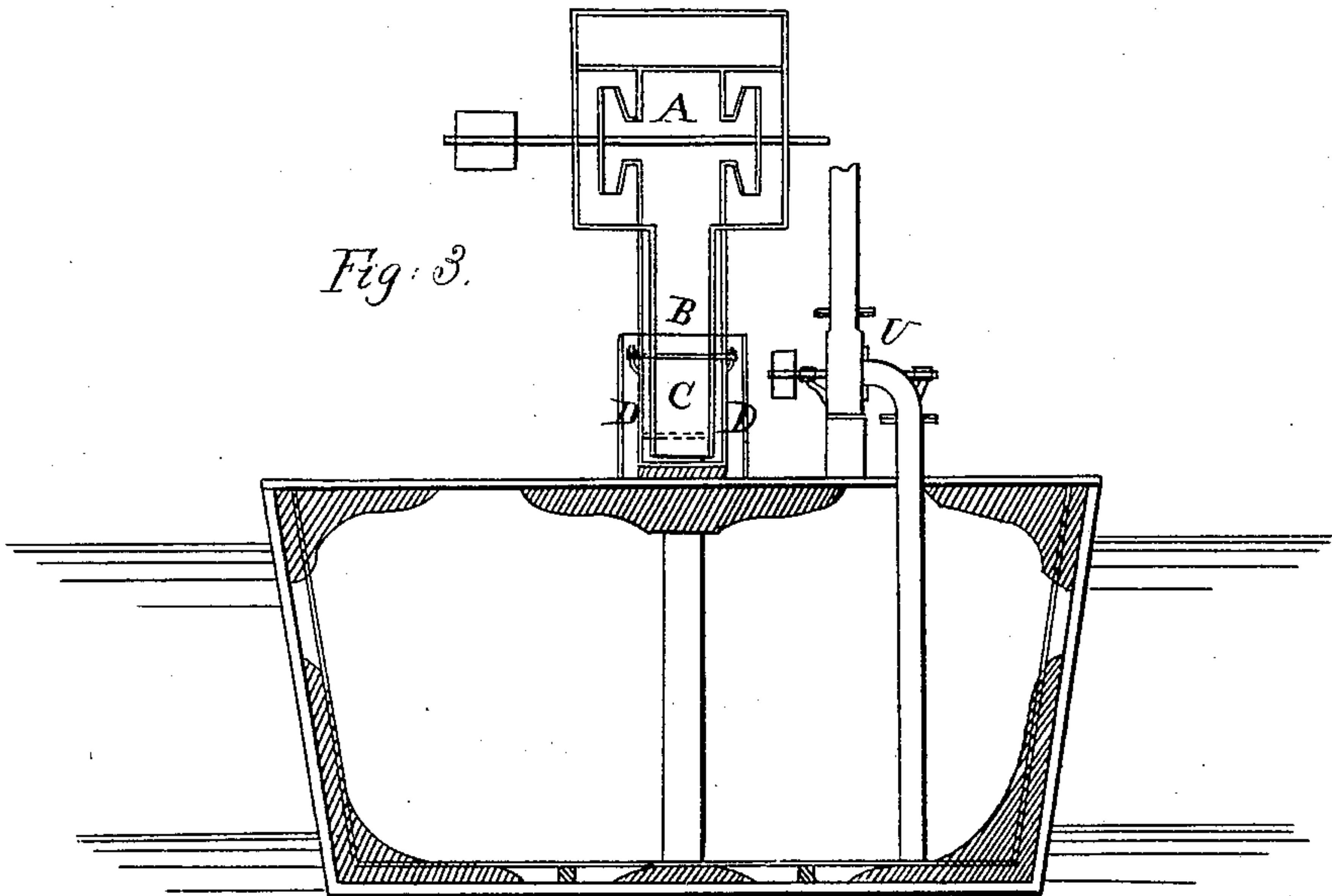


Fig: 1. Longitudinal section.

Fig: 2. Plan.

Fig: 3. Cross section.

Fig: 4. Plan of inlet and excavator.

Figs 1, 2 & 3 Scale one fifth of an inch to one foot.
Fig: 4. " one inch " " "

Witnesses:

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Inventor:

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United States Patent Office.

ALFRED DUVAL, OF BALTIMORE, MARYLAND.

Letters Patent No. 75,003. dated March 3, 1868; antedated February 28, 1868.

IMPROVED METHOD OF EXCAVATING UNDER WATER.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, ALFRED DUVAL, of Baltimore, in the county of Baltimore, and State of Maryland, have invented a new and useful Combination of Mechanical Arrangements, adapted to the use of known principles, for the Purpose of Excavating and Collecting Metallic or other Substances Submerged in Water; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings making a part of this specification, in which—

Figure 1 is a longitudinal section.

Figure 2, a plan.

Figure 3, a cross-section.

Figure 4, a plan of inlet with excavator.

To enable others skilled in mechanics to make and use my invention, I will proceed to describe the construction and operation of the same.

I use a boat, carrying a steam-engine or other motor, with the other appliances for the purpose intended. A is a centrifugal pump. B is a short supply-pipe to the pump A, through which the water and finer particles of excavated matter are raised from the recess in the box C. C is an air-tight receiving-box, with folding lids, forming a part of the supply-pipe of the pump A. D is an outer box or water-chamber, surrounding and rising above the receiving-box C, intended to be filled with water to a line above the lids of the box C, by which the same is made air-tight. E is a screen, by means of which any particles raised that are too large to pass through the discharge of the pump A are retained in the box C. F is a metallic elbow, connecting the box C with the pipe G. H is a self-acting valve. I is the inlet to the supply-pipe G. J is a coupled shaft, carrying an auger or excavator, K, working within, below, and outside of the inlet I, the lip of the excavator being inclined, by which the excavated matter is raised above the lower line of the inlet I. L is a stationary cylinder, through which the shaft J revolves, and fastened on which is a revolving piston, working within the cylinder on oil or other matter, by which the weight of the shaft J is supported. M, bevel-gear, communicating motion to the shaft J. N, a pulley on a horizontal shaft, communicating motion to the bevel-gear M. O O are anchors and ropes, by which the boat is held in position, or moved when excavating. P P P are troughs, into which the pump A discharges, with gates at Q, by which the discharge may be alternated. R R R are reverse troughs, with a movable division at S. T is a valve, by which water is let into the boat for the purpose of settling it when excavating perpendicularly. U is an auxiliary centrifugal pump, for the purpose of charging the pump A, filling the water-box D, pumping clear water into the discharge-troughs R, and for pumping out the boat when required. V is a division in the boat, (with a gate,) which forms two water-compartments, the object of which is to settle the stern of the boat, so as to elevate the joint of the lower supply pipe above the water-line, for the purpose of making convenient connections.

Operation.

The boat carrying the appliances for the purpose intended, being moved to the place of use, and secured in position, the folding lids of the receiving-box C are closed and fastened, when, by means of the auxiliary pump U, the pump A is charged, as also the water-chamber D, to a line above the folding lids of the receiving-box C. The pump A is then set in motion, as also the excavator K. When the atmospheric pressure becomes removed (by the motion of the pump A) from the supply-inlet I, then the atmospheric pressure on the water on the outside of the supply-inlet, forces a supply of water and other matter into the supply-pipe of the pump A, in proportion to its discharge, and by the assistance of the rotating excavator K, earthy and other matter is loosened below and around the inlet, and, by means of the inclined lip on the excavator K, raised above the bottom line of the inlet, when, by the pressure of the atmosphere, the earthy and other matter is forced into the receiving-box C. The coarser particles of the matter thus raised are retained in the receiving-box C, by the interposition of the screen E, and all the finer particles, with the water, are discharged into the troughs P P P and R R R alternately, as desired, and to other additional series of troughs, for the proper separation of the matter being collected. For the purpose of more effectually separating the matter being collected, clear water is pumped into the series of troughs alternately, by the auxiliary pump U. When the receiving-box C becomes filled

by the coarser particles retained in it by the interposition of the screen E, the pump A and excavator K are stopped, and the box discharged of its contents; and prepared for further operation as described. When excavating perpendicularly, water is let into the boat through the valve T, by which it is settled proportionately, to the excavation being made, and to the depth desired, as far as the settling of the boat will admit at one operation.

For making the connections of the supply-pipe, &c., for excavating in deep water: The boat being pumped out, or free from water, the gate in the division V being closed, water is let into the stern compartment through the valve T, by which means the stern is settled and the bows elevated, so that the joint of the supply-pipe, below and connecting with the valve H, is raised above the water-line, when the joint is disconnected, and also the coupling of the shaft J, and an additional length of pipe is added, as desired, and a corresponding length of shaft. The connections are then secured, and the boat brought into a horizontal position, when it is ready for deeper excavations, as desired.

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

1. The receiving-box C, forming a horizontal portion of the pipe leading from the excavator to the pump, constructed with doors to give access to its interior, and submerged in water, or otherwise made air-tight, substantially as set forth.

2. The combination of the pump A, receiving-box C, and screen E, pipe F G, and vertically working excavator K, substantially as and for the purpose set forth.

3. The combination of the receiving-inlet I and excavator K, respectively constructed and arranged to operate substantially as set forth.

4. The combination of the excavator K, vertical shaft J, and stationary cylinder L, with revolving piston for supporting the shaft, substantially as set forth.

5. The arrangement of the hull of the boat with a partition, V, valve T, and pump M, for regulating the depth of the excavator, either when at work or for the purpose of adjusting the shaft, substantially as set forth.

ALFRED DUVALL.

Witnesses:

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E. D. SWEENEY.