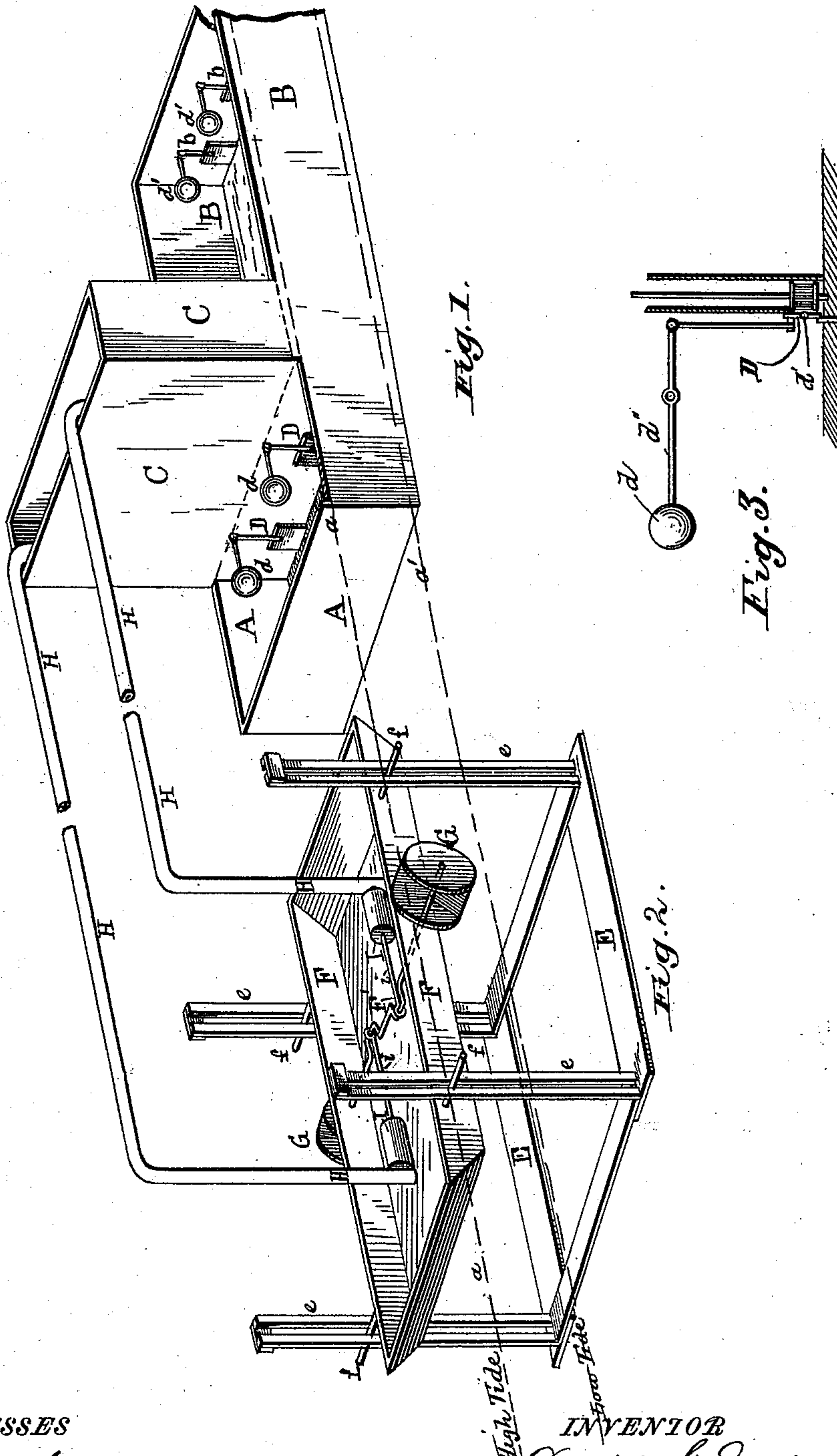


(No Model.)

D. S. EARLY.
TIDE POWER.

No. 418,705.

Patented Jan. 7, 1890.



WITNESSES
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UNITED STATES PATENT OFFICE.

DANIEL S. EARLY, OF HARRISBURG, PENNSYLVANIA.

TIDE-POWER.

SPECIFICATION forming part of Letters Patent No. 418,705, dated January 7, 1890.

Application filed September 7, 1889. Serial No. 323,338. (No model.)

To all whom it may concern:

Be it known that I, DANIEL S. EARLY, a citizen of the United States, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Tide-Powers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in "tide-powers," which will be hereinafter more particularly described and pointed out.

In the accompanying drawings, forming part of this specification, Figure 1 is a perspective view of a series of reservoirs used in the invention. Fig. 2 is a perspective view of a tidal or current apparatus for pumping water. Fig. 3 is a view of one of the automatic tide-gates.

A is a reservoir, which may be of any capacity; but to illustrate my invention I propose that it shall contain, when properly filled, about one hundred thousand cubic feet of water.

B is a second reservoir, made very much larger—say four, five, or six times the capacity of the other one A. I make it, however, four times the capacity.

C is a third reservoir, of any size convenient, and elevated above and in any suitable position or location relative to the other two.

There are any convenient number of automatic tide-gates D, &c., opening from the reservoir A into B at the bottom, and I arrange for a corresponding number of turbine wheels to receive the flow of water from A to B—as many as may be required for the power needed.

Inasmuch as automatic float tide-gates are common, I have simply represented such in the drawings, Fig. 3, by which the float *d* can open and close the gate D, which is balanced on the pivot *d'* to be easily opened by the float-lever *d''* and the connecting-rod. When the tide shall rise to the line *a* of the first reservoir A, it will flow into it and soon fill it. The tide-gates D will then be opened automatically by floats *d*, and the machinery will be set in motion by the turbines, which

are not shown in the drawings, and this will continue until all the water in A shall have been exhausted, so far as its height above the level of the water in B will have any force. Whenever the ebb-tide has reached its lowest point *a'*, the outlet-gates *b*, &c., which are in the outer walls of the reservoir B, will be automatically opened by floats *d'*, and the water in B will be rapidly discharged therefrom. As a matter of course there must be a slack time for the machinery between the low ebb and flood of the tide. That the machinery may not be idle, I have provided for a tidal boat and accompanying apparatus. A platform E is securely anchored on the bottom as near the reservoirs as practicable and in the direct line of the ebb and flood tides. From this platform E project upward any number of guides *e*, &c., which are securely braced. A boat or floating box F is so placed over the platform E that by the rods *f*, extending from the sides of the boat through the guides *e*, it is held in position laterally and can rise and fall with the tide. Across the boat F are one or more crank-shafts *F'*, extending out each side and supplied with paddle-wheels G G, which wheels dip always into the water and are moved by the tide as it ebbs and flows past the boat F. In the boat are two or more pumps I, &c., to each shaft, which pumps extend through the bottom of the boat. Connected with these pumps I are pitman-bars *i*, attached to the cranks on the shafts *F'*, and which are arranged to operate the pumps when the shafts revolve in either direction. The pipes H are extended from the pumps to the third reservoir C to supply it with water. The wheels G G are in operation during the movement of the tide in either direction, and will cause the pumps to keep up a sufficient supply of water in the reservoir C. So soon as by the exhaustion of the water in reservoir A the turbines cannot be operated by it, then the water in reservoir C will be let onto the turbines automatically by means of the tide-floats, which will be connected to the valves. Whenever the water from reservoir A begins to flow into B, the water from reservoir C is cut off automatically.

The several details of the automatic gates controlled by the rise and fall of the water,

the particular kind of pumps to be used, and the power-wheels need not be represented or described, as it is obvious how all of these can be employed, and do not form any part
5 of what I claim; but

What I do claim is—

The submerged platform E, having guides e, the floating box or boat F, supplied with the wheels G on the crank-shaft F', connect-
10 ing-rods i, pumps I, and conveying-pipes H,

in combination with a series of reservoirs A, B, and C, having suitable inlet and outlet automatic gates, all constructed substantially as and for the purpose described.

In testimony whereof I affix my signature in 15 presence of two witnesses.

DANIEL S. EARLY.

Witnesses:

WM. R. SINGLETON,

JOHN LOCKIE.