

(No Model.)

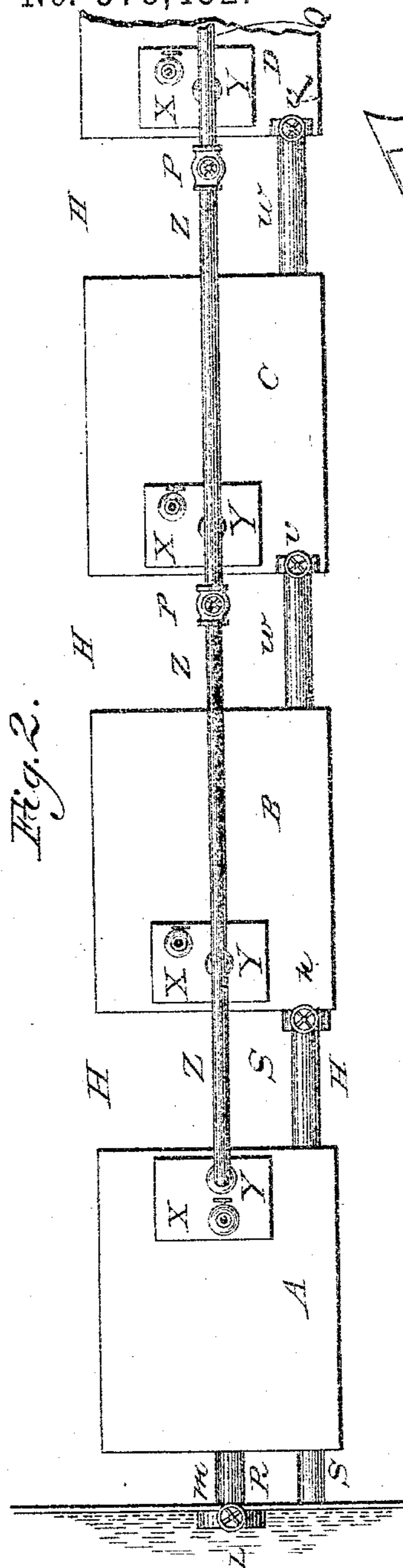
2 Sheets--Sheet 1.

E. P. LORCH.

TIDE WATER ELEVATOR OR SYSTEM OF UTILIZING THE RISE AND  
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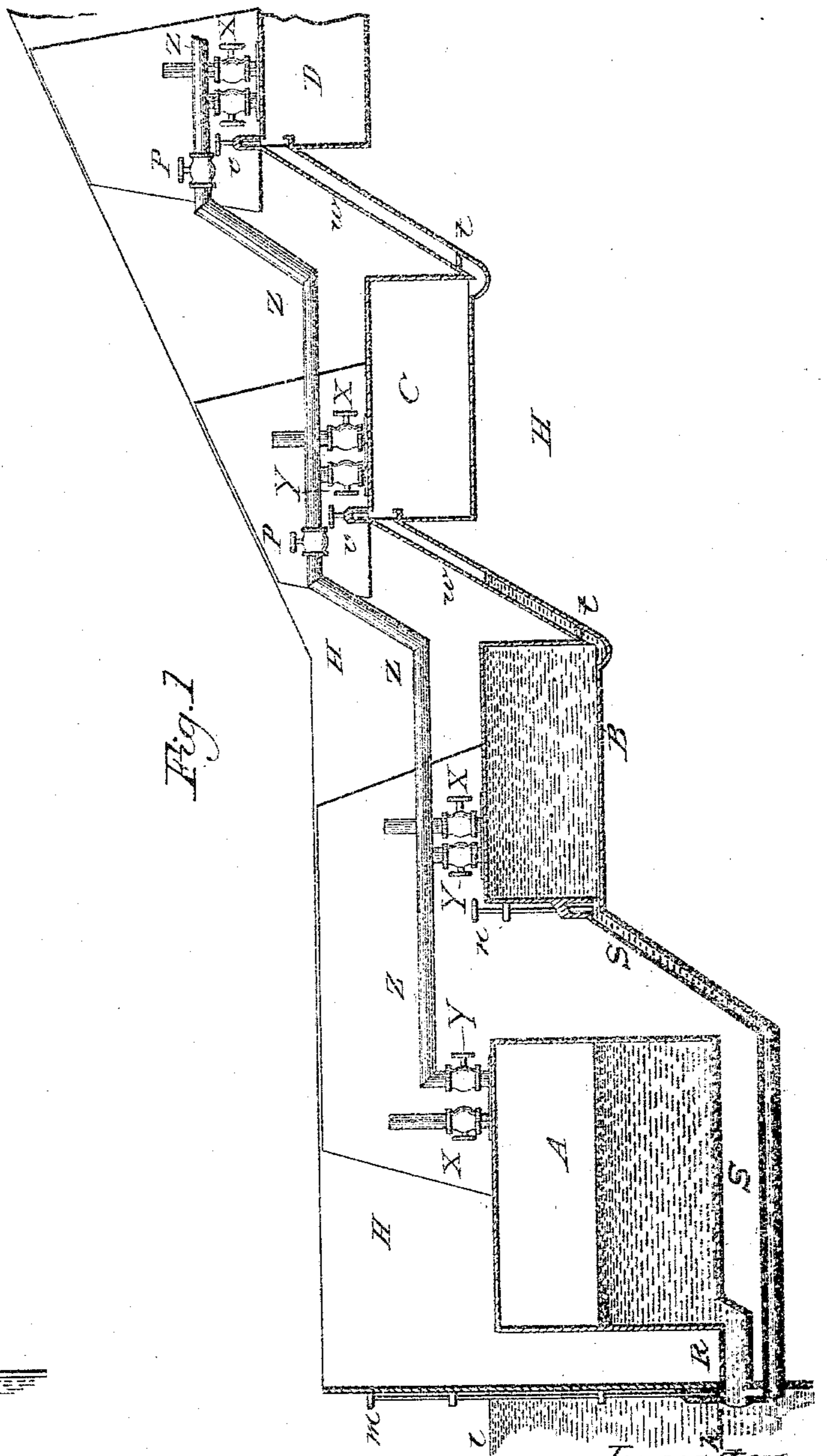
No. 378,452.

Patented Feb. 28, 1888.



Witnesses:

*E. P. Lorch*  
*C. P. Herchauer*



Inventor.

*E. P. Lorch*

(No Model.)

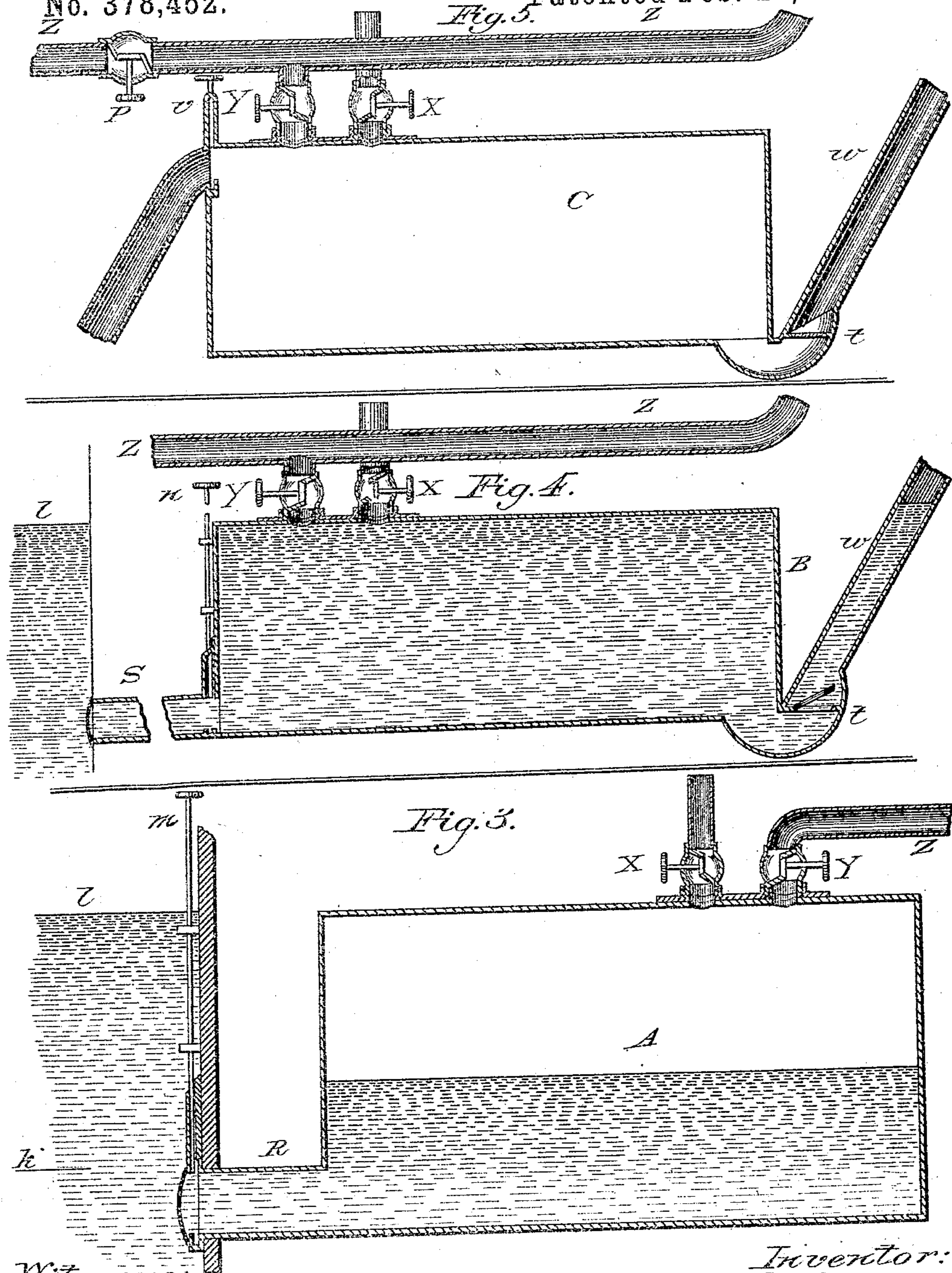
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TIDE WATER ELEVATOR OR SYSTEM OF UTILIZING THE RISE AND  
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No. 378,452.

Patented Feb. 28, 1888.



Witnesses:

*J. D. B. Smith*  
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Inventor:  
*E. P. Lorch.*

# UNITED STATES PATENT OFFICE.

ERNEST P. LORCH, OF NEW YORK, N. Y.

TIDE-WATER ELEVATOR OR SYSTEM OF UTILIZING THE RISE AND FALL OF THE TIDES.

SPECIFICATION forming part of Letters Patent No. 378,452, dated February 28, 1888.

Application filed February 24, 1887. Serial No. 223,783. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST P. LORCH, a citizen of the United States, and a resident of the city, county, and State of New York, have  
5 invented a certain Tide-Water Elevator or System of Utilizing the Rise and Fall of Tide-Water, together with the Apparatuses, of which the following is a specification.

My invention relates more especially to  
10 compressing or rarefying air by the rise or fall of tide-water and applying it to force or lift water to a higher level or employing it as motive power, together with the apparatuses I use for this purpose. I do this by having a num-  
15 ber of reservoirs, which can be hermetically sealed, so placed and connected that the rise of the tide will compress the air in one, which can then be conducted by pipes where desired and used as a motive power; but in the pres-  
20 ent instance I conduct it to a second reservoir filled with water, which it forces to a higher level. The fall of the tide can likewise be utilized with the same apparatuses by inverting  
25 its action and causing a partial vacuum to lift water from one reservoir into another placed at a higher level.

My invention will be best understood by reference to the accompanying drawings, wherein—

30 Figure 1 is a sectional elevation through L Q of Fig. 2, showing my apparatuses in position under the surface near tide-water, with man-holes for access. Fig. 2 is a ground plan of the same. Figs. 3, 4, and 5 are enlarged  
35 sectional elevations of reservoirs A, B, and C, respectively.

A, B, C, and D, which is similar to C, are all reservoirs, which can be hermetically sealed by closing their several gates and valves.  
40 Each reservoir is supplied with an opening to the air controlled by a valve, X. They are all connected by the air-pipe Z, and can be cut off by the valves Y. The reservoirs B C D are also connected by the water-pipe w,  
45 which is the outlet of B and inlet for C, and is furnished with a check-valve, t. The valve P on the pipe Z is to limit the action between reservoirs A and B or A and C, as will be set forth hereinafter.

50 Referring, first, to Fig. 1, let k represent the low and l the high water mark; H, a section of the water-front. A, which I call my "com-

pressor," may be one or more reservoirs, tanks, pipes, or chambers so placed that when its valves X and Y are closed the rising tide en-  
55 tering by inlet R, controlled by gate m, will compress the air with which it is filled during the continuance of the flood, and through the air-pipe Z can be led to any desired point and used as a motive power. In the present in-  
60 stance I employ it to force water from reservoir B to a higher level. B may be one or more reservoirs, tanks, pipes, or chambers so placed that tide-water can be readily admitted through its inlet S, controlled by the gate n;  
65 its valve to the air, X, being open and its valve Y closed, the rising tide has entirely filled this reservoir.

Figs. 1, 3, and 4 show the apparatus at this stage. Closing the gate n and the valve X of  
70 reservoir B, also the valve P on pipe Z, so the compressed air cannot act beyond, I next open the valves Y of reservoirs A and B, permitting the compressed air in A to pass through the pipe Z into reservoir B, where  
75 the pressure will relieve itself by forcing the water through w into reservoir C, placed, preferably, at a higher level. w may be supplied with a check-valve, t, of any suitable construction. Reservoir C may be one or more tanks,  
80 pipes, or chambers placed at a higher level than B. The outlet w of B is the inlet of C, and may enter the same through or near the top, as shown, controlled by a gate or valve, v. Reservoir C is likewise furnished with a  
85 valve, X, to the air, and connected with reservoirs A and B by means of the air-pipe Z, controlled by valve Y, and has a water-discharge pipe, w, supplied with a check-valve, t. The gate v and also the valve X are open, but  
90 the valve Y is closed. The water in B can therefore readily enter C until the pressure of the compressed air has relieved itself. The action is now concluded, and can be repeated at any subsequent flood with some variation. 95

Having secured, as before described, a body of compressed air in A, I now close valve Y of B, thereby cutting it out of the circuit. I next close valve P on the air-pipe Z near res-  
100 ervoir D, limiting the action of the compressed air to that point. Then, presuming reservoir C to be full of water, I close its gate v and its valve X, but open its valve Y and the valve P in Z near to C, when, by opening valve Y

of A, the compressed air will exert its pressure on the water in C, and by means of the discharge-pipe *w* will force the water into D, which may be similar to C in every respect, and has its gate *v* and the valve X to the open air. By a subsequent action we can force the water from reservoir D, with its necessary connections, into a reservoir at a still higher elevation, or into a succession of reservoirs similar to C and D.

The ebb or fall of tide can likewise be utilized with my apparatus for the purpose of lifting or drawing water to a higher level by inverting the action in manner following: The tide being at high water, I now fill reservoirs A and B by means of their respective inlets R and S. The valve X in A is now closed and I open its valve Y. In reservoir B, I now close the gate *n*, and also its valve Y; but its valve X, I have open to the air. Reservoir C is empty and has its valve X closed, also the check-valve *t*, kept so from water remaining in *w* from its previous discharge. Valve Y and gate *v* are open. The ebb tide having commenced, the water in A seeks to follow it, and so rarefies the air in C, with which it is connected by Z, the air-pipe, and exerts the exhaustion on the water in B through the pipe *w* and lifts the same into reservoir C. This action can also be repeated at any subsequent ebb, and can be varied by using reservoir A in connection with any two succeeding reservoirs similar to C.

During the last action described the valve P on pipe Z near C has been open, and the valve P on pipe Z near D has been closed.

I am aware of the patents of John McCloskey, No. 127,624, June 4, 1872; James Cochrane, No. 129,791, July 23, 1872; Molera *et al.*, No. 212,967, March 4, 1879; Samuel D. Mott, No. 352,833, November 16, 1886; Charles Maynard Walker, No. 315,863, April 14, 1885. and I wish it understood that I do not claim what is therein shown.

I wish it to be understood that I do not claim, generally, the method of raising water from one level to another by the action of a head of water made to compress air in a closed vessel, which air-pressure is then made to force water from another closed vessel to a

higher level, as I am well aware that such method was already applied in Hero's fountain.

I wish it understood that I do not claim any specifically - constructed reservoirs, gates, or valves, but employ those in ordinary use best adapted for the purpose.

Having thus described my invention, I claim—

1. The combination, with the compressor A, having an opening, R, controlled by a gate, *m*, for the ingress and egress of tide-water, of a valve, X, to the open air, and a pipe, Z, with valves Y and P, which is used exclusively for the passage of air from and to compressor A and the reservoirs B C D and any succeeding similar reservoirs, substantially as set forth.

2. The combination, with the reservoir B, having an inlet, S, for the liquid to be elevated, controlled by a gate, *n*, and an outlet for the passage of liquid into reservoir C, indicated by *w*, supplied with a check-valve, *t*, of a valve, X, to the air, and the pipe Z, used for the passage of air from compressor A to B, which is furnished with valves P and Y for controlling the action or cutting B out of the circuit when not employed, substantially as set forth.

3. The combination, with the compressor A and its parts, of the reservoir B and its parts, together with the reservoir C, or any succeeding similar reservoir, having an inlet for the admission of liquid to be elevated from the preceding reservoir on a lower level, as B, indicated by *w* and controlled by the gate *v*, and an outlet for the passage of said liquid into a succeeding reservoir on a higher level, as D, marked *w*, supplied with a check-valve, *t*, also having a valve, X, to the open air, and the pipe Z, used for the passage of air from A to C, or any succeeding similar reservoir, and from C or any succeeding similar reservoir to A, supplied with valves P and Y, for controlling the action or for cutting C or any succeeding similar reservoir out of the circuit when not employed, substantially as set forth.

ERNEST P. LORCH.

Witnesses:

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