No. 657,355. Patented Sept. 4, 1900.

J. NAGLER.

TIDE MOTOR.

(Application filed Sept. 30, 1899.)

(No Model.)

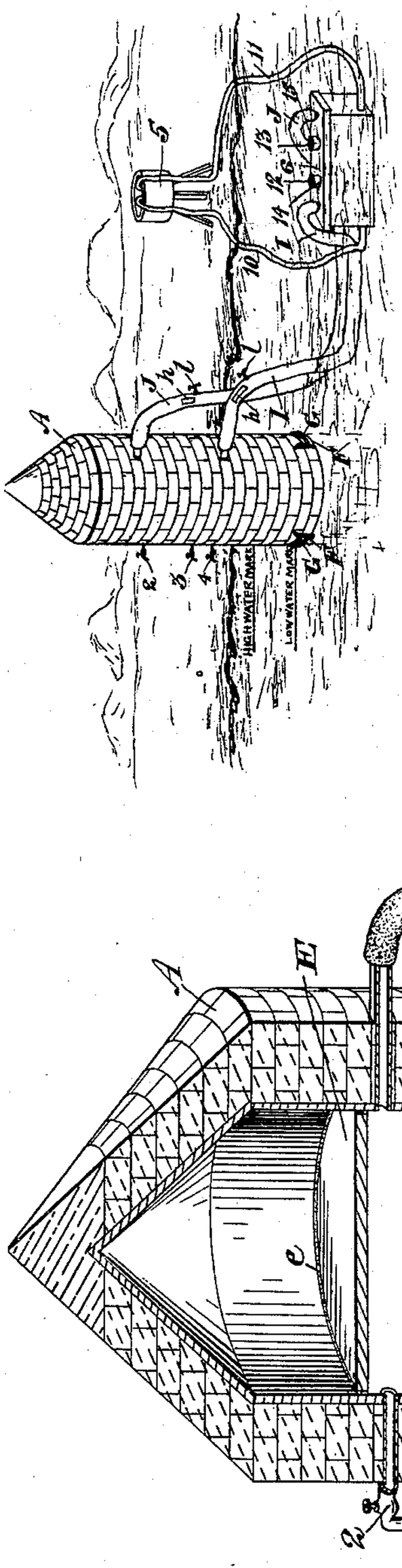

Fig. 1.

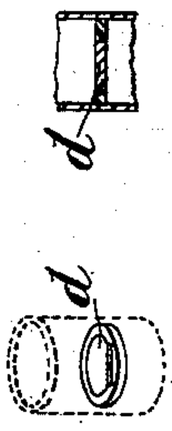

Fig. 3.

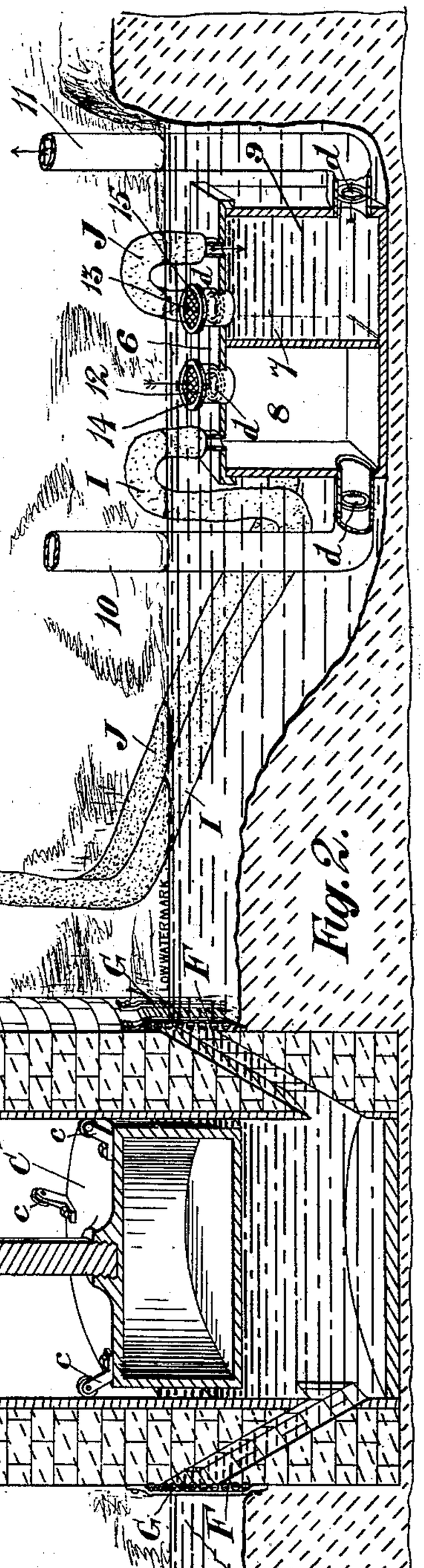

Fig. 4.

Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOSEPH NAGLER, OF TORONTO, CANADA.

TIDE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 657,355, dated September 4, 1900.

Application filed September 30, 1899. Serial No. 732,152. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH NAGLER, a subject of the Emperor of Germany, residing at Toronto, in the county of York and Province of Ontario, Canada, have invented certain new and useful Improvements in Tide-Motors, of which the following is a specification.

My invention relates to improvements in tide-motors; and the object of my invention is to provide a motor that will be operated by the ebb and flow of the tide and by means of this motor to pump air or water to any suitable reservoir; and it consists, essentially, of a suitably situated and constructed cistern or well which contains a suitably held and constructed float and an air-pump operated by said float for the purpose of pumping air to any suitable reservoir, as hereinafter more particularly explained.

Figure 1 is a general perspective view of my tide-motor, showing a reservoir connected therewith. Fig. 2 is an enlarged vertical section of my tide-motor in perspective, showing the construction and operation thereof. Fig. 3 is an enlarged perspective view of the valves used in my tide-motor. Fig. 4 is an enlarged section through one of the valves, showing the construction thereof.

In the drawings like letters and figures of reference indicate corresponding parts in each figure.

A is the tower of the tide-motor, which is preferably constructed of masonry and is built with a solid foundation near the seashore where the ebb and flow of the tide takes place.

A′ is a metal sheeting which preferably lines the major portion of the tower A.

B is a partition dividing the tower A into a well or cistern C and the air-compressing chamber D. The float C′ operates within the well or cistern C and is connected by the piston-rod C^2, having bearing in the partition B, to the piston-head D′.

E is the top of the air-compressing chamber D.

e is a packing between the sheeting A′, the partition B, piston-head D′, and top E of the air-compressing chamber. This packing *e* makes the air-compressing chamber D perfectly air-tight, and also makes the piston-head D′ air-tight. The float C′ is preferably made hollow and air-tight, as shown. The said float is made somewhat smaller than the well or cistern C and is guided in its upward and downward movements by the guide-casters *c*, secured to or forming part thereof, as shown. As will be seen from the drawings, the tower A is hollow for a short distance below the water-chutes F, which, it will be understood, introduce the water into the well or cistern C beneath the float C′.

G represents iron gratings secured over the intake-openings of the water-chutes F to prevent any foreign matter from getting into the well.

2 is a cock for the purpose of permitting the ingress and egress of air as required of the air-compressing chamber D.

3 is a cock for the purpose of drawing off water from the air-compressing chamber D should any at any time get therein.

4 is a cock for permitting the ingress and egress of air of the lower portion of the air-compressing chamber D, which is below the piston-head D′, when the said piston-head is in its lowest position, as shown in Fig. 2. This cock also enables water to be drawn from the lower portion of said chamber D should any get therein.

When my tide-motor is used for the purpose of pumping water, as shown in Figs. 1 and 2, into the reservoir 5, a suitable pumping apparatus is used in connection therewith.

Having described the principal parts involved in my invention, I shall now describe its operation. We will suppose that the tide is flowing. Consequently the float C′ in the lower portion of the cistern or well C as the quantity of water within said well increases is gradually forced upwardly. This forces the air from the chamber D through the pipe J into the pumping apparatus, from which the water is forced to a suitable reservoir.

It will of course be understood that the float C′, which I propose making of metal, will be heavy enough to pull downwardly the piston-head D′ during the ebb of the tide.

As shown in the drawings, the bottom of the well C is closed. This prevents the rush of water through the intake-pipes F from undermining the foundation of the tower A when my tide-motor is constructed in the manner shown.

The improved tide-motor which I have invented contemplates the employment of a vertically-elongated hollow tower, which is perfectly constructed of masonry and has its foundation embedded in the earth firmly. The interior of this hollow tower is equipped with a cylindrical imperforate lining, the lower end of which is closed, and this lining is divided by a transverse division-plate, so as to produce an upper compression-chamber and a lower power chamber or well. The surges of the waves are free to enter the power chamber or well of the tower through the inclined inlet-ducts, which open through the outside of the tower substantially at the low-water line, so that the waves are free to enter the tower at flood or ebb tide. The buoyant float which operates in the power-chamber is connected operatively to the piston-head through the medium of a rod which plays slidably in an opening of the division-plate, and this piston-head has its perimeter packed so as to have tight engagement with that part of the cylindrical lining of the tower which constitutes the compression-chamber. For the proper ingress of air to the compression-chamber above the piston-head I provide the valve-inlet 2, the valve of which is arranged to open automatically on the downstroke of the piston-head and to close in like manner on the upstroke of said piston-head. I employ a similar air-inlet 4 on a plane below the limit of movement of the piston-head in a downward direction, which air-inlet is in communication with the compression-chamber and is likewise equipped with the valve that opens automatically on the upward movement of the piston-head and closes in like manner on the downward movement of the piston-head. The described arrangement of the valved air-inlets makes the compression-chamber and the piston-head constitute a double-acting air-forcing mechanism in that the piston-head compresses air on the up and down strokes thereof. The eduction-pipes I J are in communication with the compression-chamber substantially on the plane of the valved air-inlets 4 2, respectively, said eduction-pipes having suitable check-valves, as heretofore described. A valved drain 3 is in communication with the compression-chamber at a point between the valved air-inlets 2 4, preferably at a point above the limit of the downward movement of the piston-head, so as to provide for the escape of any water that may accumulate in the compression-chamber.

The specific construction of the pumping apparatus illustrated in the present drawings is not claimed herein, but is covered by the claims of a companion application filed concurrently herewith.

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

A tide-motor comprising a vertically-elongated hollow tower provided with a continuous cylindrical lining, closed at its lower end, and with the inclined water-inlet ducts which open through the outside of the tower substantially on the plane of the low-water line, a division-plate fixed within said cylindrical lining and dividing the latter into a lower power-chamber and an upper compression-chamber, a buoyant float in said lower power-chamber, a packed piston-head fitted tightly in the upper compression-chamber, a piston-rod slidably fitted in the division-plate and connected to the float and to the piston-head, a valved air-inlet 2 opening into the compression-chamber above the upper limit of the travel of the piston-head, another valved inlet 4 opening into the compression-chamber at a point below the lower limit of travel of said piston-head, a drain-cock 3 between the air-inlets, and eduction-pipes leading from the compression-chamber on the planes of the inlets 2, 4, respectively, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOSEPH NAGLER.

Witnesses:
L. C. REYNOLDS,
EGERTON R. CASE.