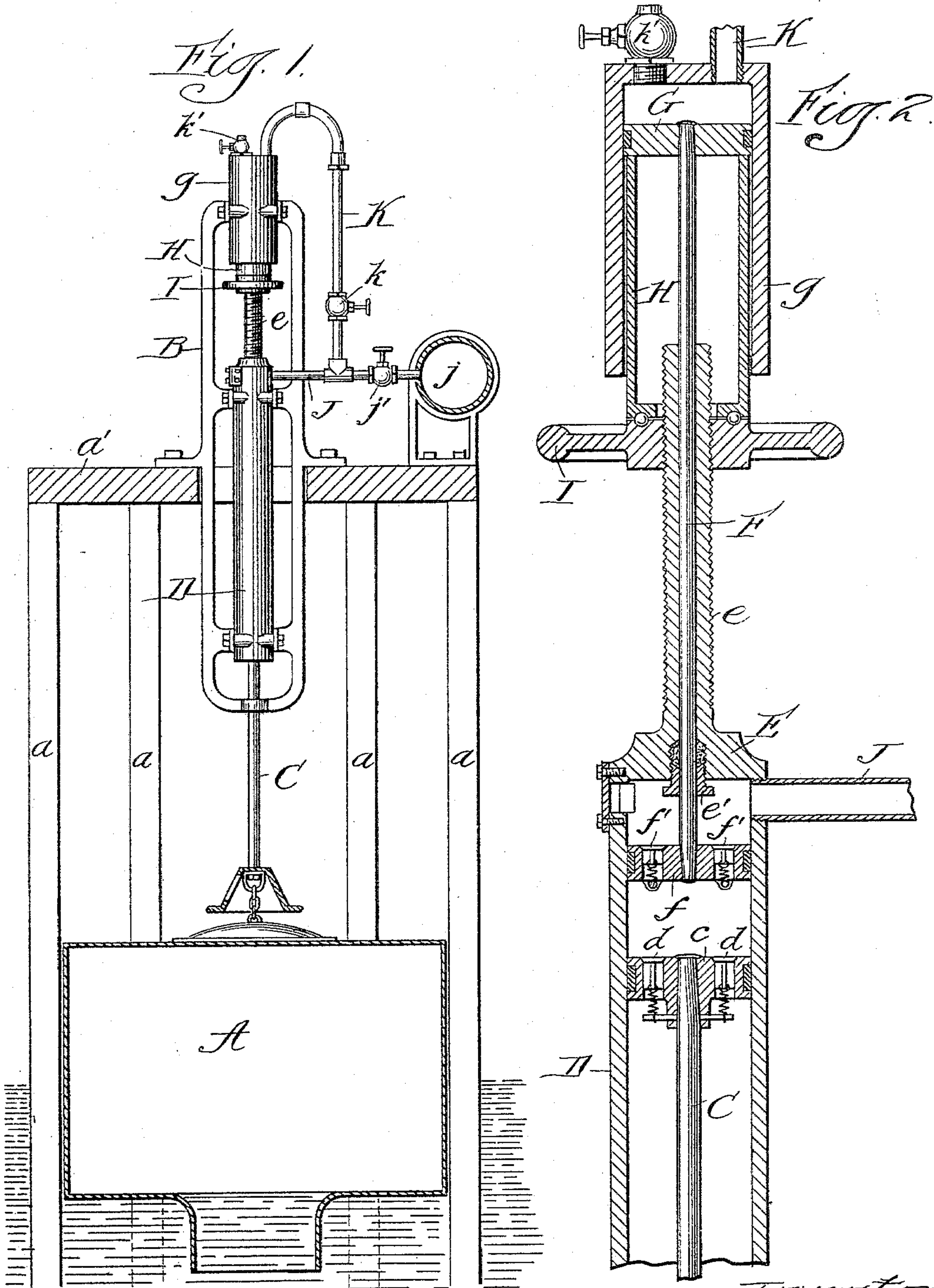


(No Model.)

J. McA. PALMER.
WAVE POWER.

No. 597,833.

Patented Jan. 25, 1898.



Witnesses.
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UNITED STATES PATENT OFFICE.

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WAVE-POWER.

SPECIFICATION forming part of Letters Patent No. 597,833, dated January 25, 1898.

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To all whom it may concern:

Be it known that I, JOHN MCAULEY PALMER, a citizen of the United States, residing at Fort Grant, in the county of Graham and Territory of Arizona, have invented certain new and useful Improvements in Wave-Powers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to certain improvements in wave-powers of the general type referred to in an application executed concurrently herewith, in which a movable float is employed to actuate a piston which forces fluid through suitable mechanism to a conduit or receiver and in which a hollow buffer-piston rod carries pistons on its ends adapted to operate, respectively, in the pressure-cylinder and the buffer-cylinder, the fluid being forced by the pressure-piston through the hollow buffer-piston rod into the buffer-cylinder and from thence to the conduit or receiver.

The object of the present invention is to provide an apparatus in which a constant pressure may be maintained above the buffer-piston which will be entirely unaffected by the fluid forced into the conduit or receiver by the pressure-piston.

A further object of the invention is to provide an apparatus in which the fluid which supplies the pressure above the buffer-piston may be forced therein by the pressure-piston until the proper quantity has been obtained and then cut off, so that the pressure above the buffer-piston may be maintained irrespective of the operation of the pressure-piston.

With these and other ends in view my invention has been illustrated in the accompanying drawings, in which—

Figure 1 is a view of my complete apparatus, partly in section. Fig. 2 is a sectional view of the principal operating parts.

Referring to the drawings, in which like letters of reference denote corresponding parts in both figures, A designates a float which is confined by the piles *a*, surmounted by a platform *a'*, upon which the frame B, carrying the operating mechanism, is mounted.

The pressure-piston rod C is connected at its lower end to the float and carries on its upper end a pressure-piston *c*, which operates

in a pressure-cylinder D, and is provided with upwardly-opening valves *d*. A head E is secured on the top of this pressure-cylinder, and it is provided with an exteriorly-threaded hollow extension *e*, which forms a guide-tube for the buffer-piston rod F. The buffer-piston rod carries a piston *f* on its lower end, which operates in the pressure-cylinder above the pressure-piston and forms, in effect, an adjustable head for this pressure-cylinder, being provided with upwardly-opening valves *f'*. The buffer-piston rod is arranged to fit snugly in the guide-tube *e*, and bushing *e'* is provided to make a piston fit. The buffer-piston rod carries on its upper end a buffer-piston G, which has a piston fit with and operates in a buffer-cylinder *g*. A supporting-cylinder H is arranged within the buffer-cylinder beneath the buffer-piston, and this cylinder limits the downward movement of the buffer-piston and piston-rod and supports these parts when the pressure above the buffer-piston is not overcome by the pressure beneath the piston *f* or adjustable head for the pressure-cylinder.

A screw-wheel I is arranged on the extension *e*, and it supports the cylinder H, this screw-wheel being adjustable vertically and carrying the supporting-cylinder with it to change the limit of the downward movement of the buffer-piston.

A pipe J leads from the top of the pressure-cylinder to the conduit or receiver *j*, being provided with a valve *j'*. Another pipe K leads from the top of the buffer-cylinder and connects with the pipe J between the pressure-cylinder and the valve *j'*. A blow-off valve *k'* is provided at the top of the buffer-cylinder.

The operation of the apparatus herein described is as follows: The upward impulse of the waves acting on the float causes the latter to rise and fall, and as it rises the pressure-piston compresses the air between itself and the pressure-cylinder adjustable head *f* until the pressure of this air is sufficient to open the valve *f'*, which permits the air compressed by the pressure-piston to pass through the pipe J into the receiver. As the float and pressure-piston descend the valves *f'* close and the valves *d* open to renew the supply of air above the pressure-piston.

It is well known that the impulses of the waves are very irregular, and to provide for this irregular movement and prevent the action of the pressure-piston from injuring the parts of the apparatus and to give to the apparatus a substantially regular and even movement a buffer is provided above the buffer-piston, which controls and regulates the movement of the pressure-piston. To supply air to the buffer-cylinder, the valve *j'* is closed and the valve *k* opened, whereby the air forced into the pipe J by the pressure-piston will pass up through the pipe K into the buffer-cylinder, and when a sufficient quantity of air has been obtained to provide a buffer of proper resisting power the valve *k* is closed and the valve *j'* opened. If the pressure in the buffer-cylinder is too great, the valve *k'* may be opened until the pressure has been reduced.

In the drawings I have shown the frame B rigidly secured to the platform *a'* and the pipe connection made of metal; but it is obvious that the frame may be pivotally mounted on the platform and the pipe connections made of flexible tubing in order that the operative mechanism can be disconnected from the float and turned into a horizontal position to protect it from gales and storms.

I have shown and described my invention as it is intended to use the same for compressing air; but it will be distinctly understood that the same apparatus can be employed for forcing gas, water, or other fluids with only such changes as will occur to a skilled mechanic.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a conduit or receiver, a pipe connection from the top of said pressure-cylinder leading to the conduit or receiver to convey the air directly from said pressure-cylinder to the conduit or receiver and a movable buffer located within the pressure-cylinder and operating above the pressure-piston, substantially as described.

2. In a wave-power, the combination with a movable float, of a pressure-cylinder having a closed head, a pressure-piston operating therein and adapted to be actuated by the float, a conduit or receiver, a pipe extending from said pressure-cylinder, below its head, to the conduit or receiver, and a buffer-piston arranged to operate in the pressure-cylinder between the pressure-piston and said head, substantially as described.

3. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a buffer-piston rod carrying pistons on its ends adapted to operate respectively in the pressure-cylinder and the buffer-cylinder, a con-

duit or receiver and a pipe leading from said pressure-cylinder to the conduit or receiver to conduct air from the pressure-cylinder directly to the conduit or receiver, substantially as described.

4. In a wave-power, the combination with a movable float, of a pressure-cylinder having an air-tight head, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a buffer-piston rod operating through the head of the pressure-cylinder and carrying pistons on its ends arranged to operate respectively in the pressure-cylinder and the buffer-cylinder, an air conduit or receiver and a pipe leading from the top of said pressure-cylinder, immediately below the head, to the air conduit or receiver for conducting air from the pressure-cylinder directly to the conduit or receiver, substantially as described.

5. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a buffer-piston rod carrying pistons on its ends adapted to operate respectively in the pressure-cylinder, a buffer-cylinder, an air conduit or receiver, a pipe leading from the pressure-cylinder to the air conduit or receiver and connections intermediate of the buffer-cylinder and the pressure-cylinder, whereby the pressure-piston may force air into the buffer-cylinder, substantially as and for the purpose described.

6. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a buffer device operating above the pressure-piston in the pressure-cylinder and means for maintaining a constant pressure above the buffer device and in the buffer-cylinder, substantially as described.

7. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a piston-rod carrying pistons on its ends operating, respectively, in the pressure-cylinder and buffer-cylinder, the pressure-piston and the piston on the lower end of the buffer-piston rod being provided with valves opening in the same direction, an air conduit or receiver, a pipe J leading from the pressure-cylinder above the piston on the lower end of the buffer-piston rod and connected to the air conduit or receiver and provided with a valve, and a pipe leading from the top of the buffer-cylinder to the pipe J and connected therewith between the valve in said pipe and the pressure-cylinder and provided with a valve itself, substantially as described.

8. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a buffer-piston rod carrying pistons on its ends

adapted to operate, respectively, in the pressure-cylinder and the buffer-cylinder, an air conduit or receiver, a pipe leading from the top of the pressure-cylinder to the air conduit or receiver and connections with the top of the buffer-cylinder and said pipe whereby air may be forced directly into the buffer-cylinder by the pressure-piston, substantially as and for the purpose described.

9. In a wave-power, the combination with a movable float, of a pressure-cylinder, a pressure-piston operating therein and adapted to be actuated by the float, a buffer-cylinder, a solid buffer-piston rod carrying pistons on its

ends adapted to operate, respectively, in the pressure-cylinder and the buffer-cylinder, an air conduit or receiver, a valved pipe J connecting the air conduit or receiver with the top of the pressure-cylinder and a valved pipe connecting the top of the buffer-cylinder with the pipe J whereby the air forced by the pressure-piston may be directed into the air conduit or receiver or into the buffer-cylinder, substantially as described.

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