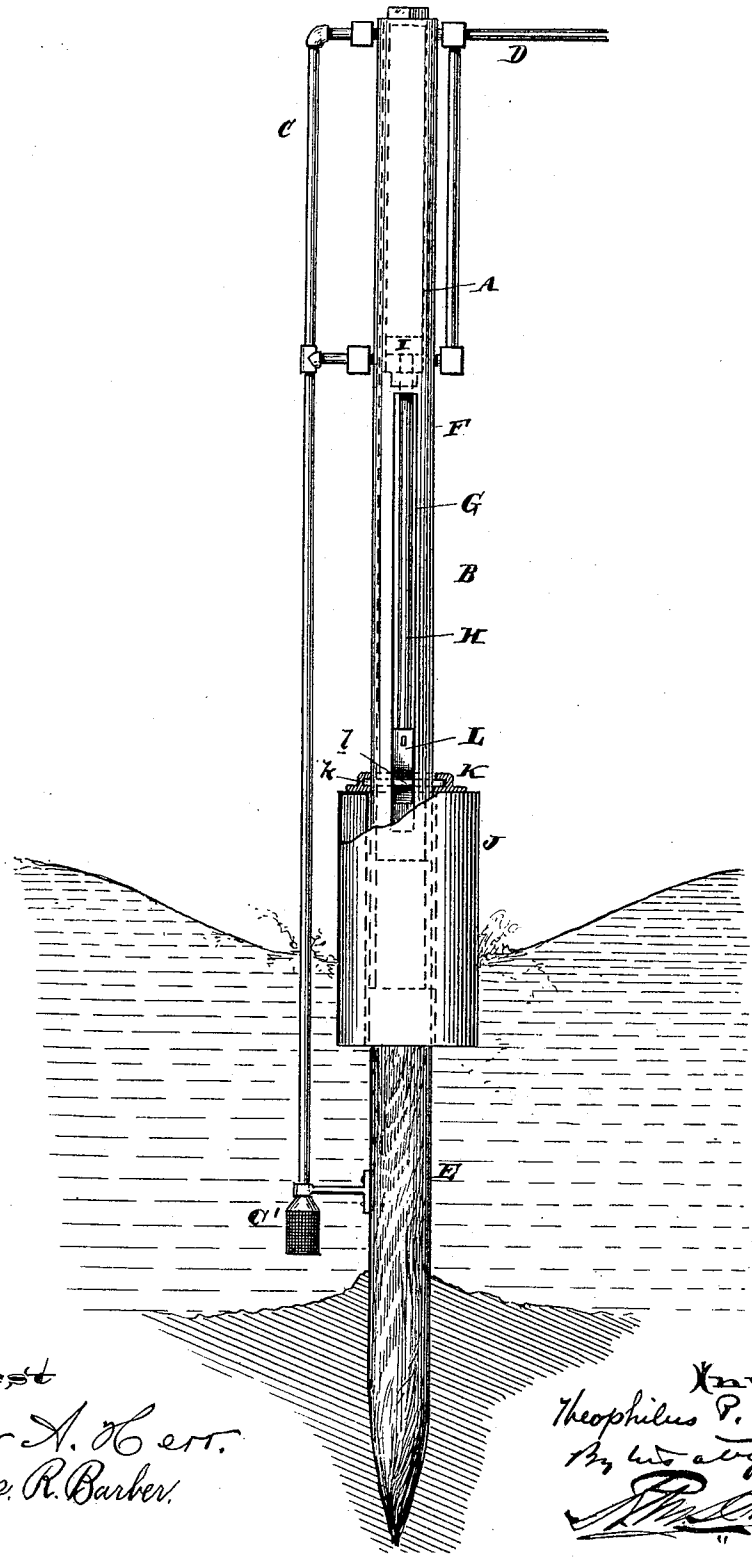
(No Model.)

T. P. CHANDLER, Jr.

UTILIZING WAVE POWER.

No. 328,759. Patented Oct. 20, 1885.



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UNITED STATES PATENT OFFICE.

THEOPHILUS P. CHANDLER, JR., OF PHILADELPHIA, PENNSYLVANIA.

UTILIZING WAVE-POWER.

SPECIFICATION forming part of Letters Patent No 328,759, dated October 20, 1885.

Application filed July 25, 1884. Serial No. 138,713. (No model.)

To all whom it may concern:

Be it known that I, THEOPHILUS P. CHANDLER, Jr., of the city and county of Philadelphia, and State of Pennsylvania, have invented new and useful Improvements in Apparatus for Utilizing Wave-Power, of which the following is a specification.

My invention has reference to hydraulic apparatus for pumping water, compressing air, &c.; and it consists in certain improvements fully set forth in the following specification, and shown in the accompanying drawing, which form part thereof.

The object of my invention is to provide a simple, cheap, and yet most durable construction of apparatus adapted to pump water, compress air, &c., which shall be essentially formed like a pile, whereby it may be readily driven into the beach, lake, or river-bottom, and while capable of performing its duty in the most effective manner shall form as little obstruction as possible to heavy breakers, ice, and floating timbers. Being formed like a pile great strength combined with effectiveness in design are capable of embodiment in the device. In such constructions of tide-power machines as illustrated in Patent No. 235,105, to Speakman, the float is guided between and at the side of the piles. In my construction I have endeavored to place all parts in line and guide the float upon the single pile, whereby its movements in a vertical line are insured, and the cost of construction is reduced to a minimum. The device when reduced to a single pile, as in my construction, is easy to handle, erect, or transport. When utilizing tide-power, the vertical movements are so slow that it is not necessary to have all parts in true line; but where the entire apparatus is supported on one pile and adapted for the quick and rough action of the waves, the parts—viz., pump, pile, and float—should be as near as possible in direct line.

This apparatus may be used to great advantage in small lake-shore towns to supply water, to sea-shore resorts for supplying water for salt-water baths, or for driving water-elevators in hotels and dwellings. If it is not desirable to use salt-water, the supply-pipe may be made to draw its supply water from the sand some distance below the surface, or from a well located upon the land.

Aside from the above there are many other uses to which such an inexpensive apparatus may be used with advantage; but it is not necessary to enumerate them here.

In the drawing is shown an elevation of hydraulic apparatus embodying my improvements.

A is the pump-cylinder, and preferably of a length equal to the rise and fall of the greatest normal wave or to the rise and fall of the tide, if the apparatus be used upon tidal water. The pump-cylinder A is secured within a casing, F, having guide-slots G, secured upon a wooden or metal pile, E, which is driven into the sand, as shown.

The two sections E and F of the pile may be secured together by a sleeve-joint, as indicated in dotted lines, or may be bolted or otherwise securely held in line, the particular mode of securing them being immaterial to my invention.

I is a piston, and H is the piston-rod, which is secured to a cross-head, L, guided by the slots G and having lugs *l*, which project and are received in an annular groove, *k*, in the ring K, which is secured upon the float J. This float J is preferably cylindrical, having a vertical aperture, through which the pile extends, it thereby encircling the same, and is adapted to rise and fall upon it, being guided thereby. As it rises and falls it reciprocates the piston I and causes water to be sucked up through the suction-pipe C, which may be supplied with a strainer, C', upon the bottom, if desired, and is discharged by a pipe, D, which may extend to the shore.

From the construction shown it is clear that the float J may freely revolve as well as move vertically up and down, yet only its vertical movements are transmitted to the piston I.

The float J rises and falls with every wave, constantly pumping water, and as the tide rises the same reciprocations constantly take place; but both the float J and the piston I are now reciprocated in a higher plane. At high tide the piston would be working in the upper part of the cylinder A, while at low tide it would be working in the lower part of the cylinder A. There are two motions imparted to the piston, one a slow up-and-down motion the entire length of the cylinder, and the other a quick reciprocating

motion of short stroke, which will be performed, say, six thousand times to each one of the long or slow strokes. This apparatus with modifications may readily be placed on ships, for the hull of a vessel would support the pile or frame B, and the waves could be utilized to operate the pump and keep the hold clear of water, and for other purposes, as ventilation, motive power, &c.

It is evident that the pump A may be placed below the water-level, if so desired; and in place of making the pile partly of wood and partly of iron it may be formed entirely of wood, and the pump and its guides secured thereto; and, if desired, several of these piles may be united together to form a battery, and thereby increase their strength and durability.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In hydraulic apparatus for utilizing wave-power, a vertical pile combined with a pump secured thereto, an annular float encircling said pile and adapted to rise and fall vertically, being guided thereon, and a connection between the said float and piston of said pump and by which the vertical movements of said float actuates the pump, substantially as and for the purpose specified.

2. A pump-pile, consisting of a wooden lower portion and a metallic upper portion, the two parts being secured in line end to end, in combination with an annular metallic float adapted to encircle the said pile and which is guided vertically thereon, the said float being balanced upon the said pile as a guide, and connecting mechanism between the said float and the piston of the pump by which the piston is reciprocated vertically and the said float is allowed to rotate upon its vertical guide or pile, substantially as and for the purpose specified.

3. A pump-pile, which consists of the lower wooden section, E, and the upper metallic tubular section, B, in combination with a pump, A, formed or contained in the said tubular section B, a piston-rod, G, working within the tubular section and being guided therein, and a float, J, encircling the said pile and connected with the said piston-rod, substantially as and for the purpose specified.

4. A pile combined with a pump formed integral with or secured thereto and in the same line therewith, guides for the piston-rod, and a float encircling and guided by said pile and connected to said piston-rod by a swivel-joint by which said float may revolve upon said pile, substantially as and for the purpose specified.

5. In hydraulic apparatus for utilizing wave-power, the pump, combined with a pile to which it is attached and a float encircling said pile and guided thereby and adapted to actuate the piston of said pump, substantially as and for the purpose specified.

6. A lower section of a pile driven down into the sand and combined with an upper section detachably secured thereto, the upper section containing a pump, and a float guided by said compound pile and adapted to actuate the piston of the pump, the two sections of the pipe being detachably fitted end to end to form one long pile, and which upper section and float may be removed in the winter or during the time it is not required in use, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

THEOPHILUS P. CHANDLER, JR.

Witnesses:
R. M. HUNTER,
FRANCIS S. BROWN.