UNITED STATES PATENT OFFICE.

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WAVE-MOTOR PUMP.


1,202,290.


To all whom it may concern:

Be it known that I, GEORG HILLE, a subject of the Emperor of Germany, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Wave-Motor Pumps, of which the following is a specification.

This invention relates to improvements in pump and pumping systems, in which water may be raised by the utilization of natural forces and in particular by the action of marine waves.

The objects of this invention are, first, to provide an apparatus combining a plurality of counter-weighted floats, operable by wave fluctuations, with a peculiar type of force pump whereby water is forced through a pipe to any desired distance, the action being automatic and continuous.

A second object is to provide means whereby the mechanism is automatically raised and lowered with the rise and fall of the tide without disturbing its operative functions.

These and other allied objects, which will become manifest as the description proceeds, are attained by the novel construction and combination of parts, together with the manner in which they are operated, as hereinafter explained and shown in the accompanying drawings, forming part of this specification, and in which:

Figure 1 is a general side elevation of the complete structure, including the submerged and shore portions, showing a break therein. Fig. 2 is an end view of the same, looking toward the beach. Fig. 3 is an enlarged side view of the truck and mechanism. Fig. 4 is a sectional plan view of the same, taken on line 4-4 of Fig. 3. Fig. 5 is a fragmental side view, similar to that shown in Fig. 3, but showing the parts in a different position. Fig. 6 is a transverse sectional view, taken on line 6-6 of Fig. 3. Fig. 7 is a side view of a pumping element in detail. Fig. 8 is a further enlarged sectional plan view of a throat plate, taken on line 8-8 of Fig. 9. Fig. 9 is a cross sectional view of the same, taken on line 9-9 of Fig. 8. Fig. 10 is an enlarged transverse sectional view taken substantially on line 10-10 of Figs. 4 and 12. Fig. 11 is a further enlarged sectional view of one of the hollow guide columns, taken on line 11-11 of Fig. 10, and Fig. 12 is a sectional view showing the interior of a pump cylinder, taken on line 12-12 of Fig. 10.

In the general view shown in Fig. 1 the structural arrangement is clearly apparent, the ground-surface, both on shore and below the water, being indicated by the numeral 15 and the water line 16. An embodiment of the invention includes a truck-way 17, beginning at 18 on the shore and extending in an inclined plane downward below the water surface 16 to a fixed stop or bumper 19, the track being supported by pillars or columns 20 spaced at intervals and rigidly secured in the ground. On this track-way is a track movable by means of a cable 21, attached to the winch 22 on the shore well above high water line, so as to be always accessible.

A pipe line 23 leads from the pumps on the truck to the discharge pipe 24, from whence the water is conducted as desired. The truck consists of a base 25, preferably of commercial rolled structural steel shapes, supported by brackets 26 in which are mounted the wheels 27, the latter being suited to the trackway 17.

Rising vertically from the base are rigid hollow columns 28, connected and strengthened by braces 29, and slidably engaged with the columns 28, which are shown to be of rectangular cross section, are saddles 30 connected in pairs by tubes 31 extending from side to side of the truck and further bracing the columns 28.

Held rigid with the saddles 30 and rotatable on the tube 31, are hollow drums or cylinders 32, having heads 33 for convenience in assembling, and formed with a pair of spaced webs 34, inclosing a chamber 35 therebetween, the webs at the center forming a hub 36 suited to the tube 31.

Closely fitting within the cylinders 32 between the heads 33, are plates 37, having hubs 38 rigidly keyed to the tubes 31, as are also the hubs 39 of the levers 40, the latter being disposed between the adjacent cylinder heads at the middle of the tubes.

The plates 37 are so disposed with reference to the interior of the cylinders that one portion can operate on one side of the walls 34, and the other portion on the other, (see Fig. 12) thus, when the levers 40 are actuated, the plates are caused to advance and recede from the walls 34, forming different angles therewith and constantly changing the area therebetween. If for instance the
levers 40 be moved in the direction of the arrow, (see Fig. 12) water is caused to enter the cylinders through the ports 41 in their walls, the flap valves 42 open as the internal pressure is removed. At the same time any water which may be in the cylinder between the back side of the plates 37 and the walls 34 passes through the parts 43 in the plate, the pressure of the water causing the flap valves 44 to open. Thus the spaces between the face of the plates 37, and rigid walls 34, become filled with water during the downward movement of the levers 40; when the levers are moved up, that is in a reverse direction, the parts 41 and 43 become closed by their respective flap valves and the water is forced through the check valves 45, into the chambers 35, which communicate through openings 46 with the interior of the tubes 51. 

From the ends of these tubes the water enters recesses 47 in the saddles 30 and when there is sufficient force, open one or more of the spring check valves 48, leading to the interior of the hollow columns 28, from whence the water passes out at the top through ordinary pipe fittings to the pipes 49, connecting with the pipe line 25, a check valve 50 preventing the return of water to the pump cylinders. Thus it will be seen that by oscillating the levers 40 a powerful stream of water can be obtained.

Motion is communicated to the levers by reason of their connection with the floats 50, through cables 51; the floats rising and falling with wave fluctuations and being counter-balanced by the weights 53.

Guides or throstiles 54 are provided at the upper part of the machine, attached to bars 55 and 56 extending across and rigidly engaged with inclined surfaces on the columns. It is desirable that these throstiles be made as frictionless as possible, and therefore include a plurality of concave faced rollers 58 so arranged in a circle as to present a substantially unbroken surface to the cable passing through.

Formed with the saddles 30 are brackets 60 and 61, respectively at the front and rear of the columns 28 and pivotally mounted in them are levers 62 and 63 both extending toward the rear at divergent angles. These levers are connected in pairs from side to side of the structure by rods 64 which are engageable by the levers 40 at the extreme ends of their stroke; so as to be turned on their pivot supports.

Formed with the lever 62 is a pawl 65 engaging with notches 66 recessed in the columns 28, and attached to the lever 63, so as to be slightly movable therein, is another pawl 67, pivoted in the lug 69 the point of which engages with the notches 68 formed in the opposite side of the column 28.

Pull springs 70 and 71 are attached respectively to the levers 62 and sliding-pawl 67 to maintain them in proper operative position.

By comparing Figs. 3 and 5 it will be noticed that in the latter the pumps are shown at the upper part of the structure, while in the former figure they are at the bottom; this shifting of position is accomplished by the substantial variations in normal water level as communicated through the floats, which being constantly operated by the irregularities of the water surface, that is the waves, cause the lever 40 to move up and down. If this movement in either direction exceeds the normal limit the lever contacts with one of the rods 64; if it be the upper, motion is communicated through the lever 62, releasing the pawl 65 so that a continued upward effect of the float will cause the pump mechanism to rise; obviously when the float descends, the opposite pawl having engaged with a higher notch in the column, the mechanism will be held in an elevated position, and it will be readily understood that if the float drops below a certain amount that a reverse effect will be produced. Thus the submergence of the pumps is substantially uniform irrespective of tides or other relatively lengthy periods of high or low water.

Many structural details are subject to modification from those shown; hence it is not desired to be confined strictly to the embodiment indicated, but changes may be made within the scope of the appended claims.

Having thus described the invention and disclosed its construction and purpose, what I claim as new and wish to secure by Letters Patent, is:

1. In a wave motor pump, a rigid frame having top and bottom members, hollow columns extending therebetween, pipes leading from said columns, saddles slidably arranged in pairs between oppositely disposed columns, tubular shafts connecting therebetween, pumps mounted on said shafts and delivering thereto, and means for operating said pumps, said means being actuated by the intermittent rise and fall of waves.

2. In a wave motor pump, a rigid frame having top and bottom members, the hollow columns extending therebetween, pipes leading from said columns, saddles slidably arranged in pairs between oppositely disposed columns, tubular shafts connecting therebetween, pumps mounted on said shafts delivering water therein, and means for operating said pumps, said means being actuated by the intermittent rise and fall of waves, and means whereby said saddles are raised or lowered on said columns by the periodic ebb and flow of the tide.

3. In a submerged motor pump, a plurality of hollow columns having tubular connections therebetween, valves combined...
with said columns, saddles slidable on the columns, tubular shafts connecting said saddles in pairs, and communicating therethrough with the hollow columns, pump cylinders mounted axially on said shafts, for actuating said pistons through the motion of the body of water in which the cylinders are submerged.

4. In a pump, a cylindrical casing, heads rigidly engaged therewith, a pair of parallel walls disposed from side to side of said casing inclosing a chamber therebetween, a plate mounted to rotate within said casing on the axis thereof, said plate extending into the space on each side of said walls, oppositely disposed inlet valves in the wall of said casing leading to the mentioned spaces, check valves in each of said parallel walls leading to the mentioned chamber, a tubular shaft upon which said casing is mounted, said shaft having open passageways communicating with the mentioned chamber, and means for oscillating said plate whereby water is caused to enter said inlet valves when said plate is moved in one direction and be forced through said check valves and chamber into said shaft when said plate is moved in a reverse direction.

Signed at New York, in the county of New York and State of New York, this fourteenth day of May, A. D. 1915.

GEORG HILLE.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."