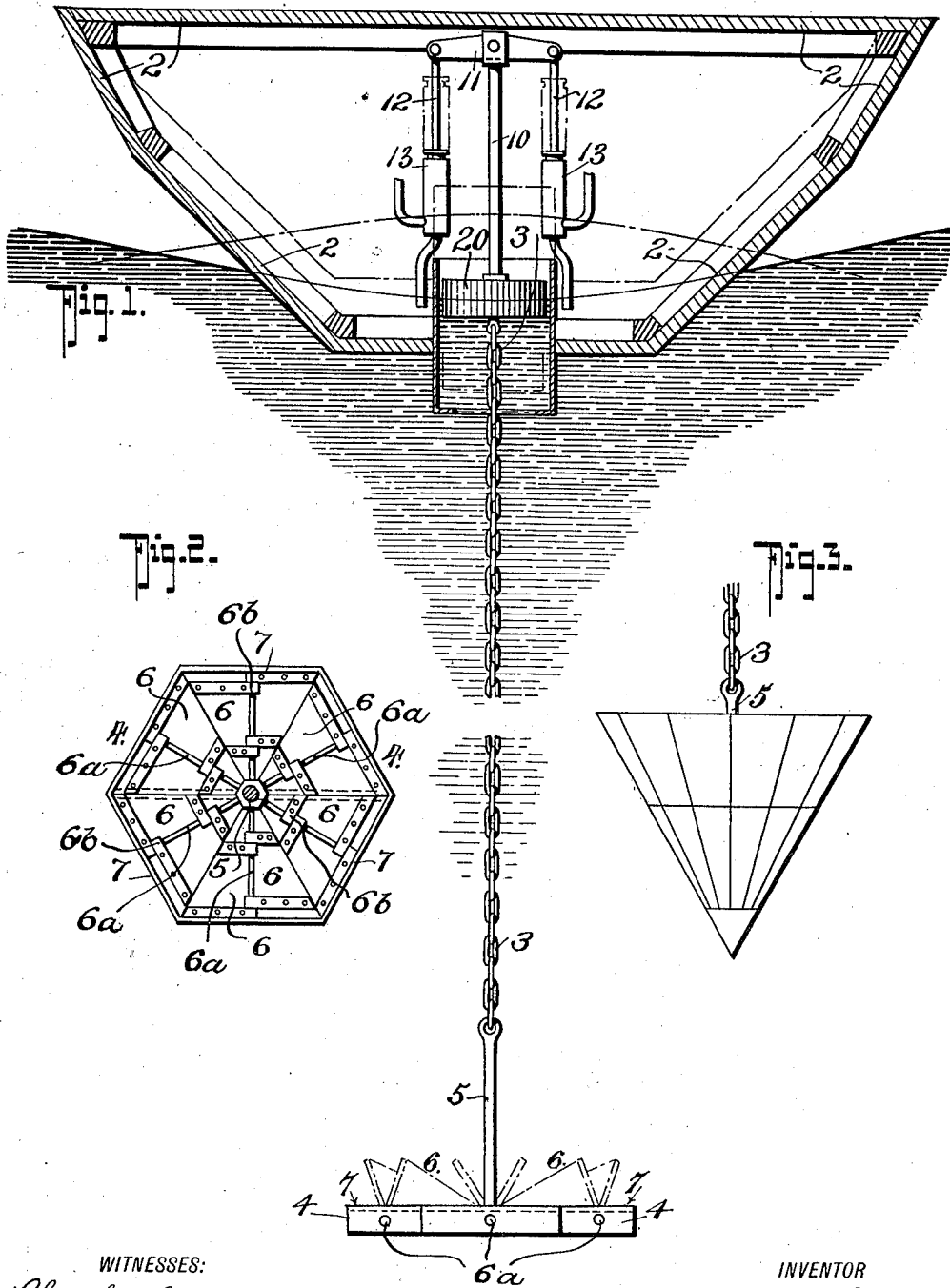


E. L. AYERS.  
WAVE MOTOR.

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# UNITED STATES PATENT OFFICE.

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## WAVE-MOTOR.

997,731.

Specification of Letters Patent. Patented July 11, 1911.

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To all whom it may concern:

Be it known that I, EDWARD L. AYERS, citizen of the United States of America, residing at North Vancouver, in the Province of British Columbia, Canada, have invented a new and useful Wave-Motor, of which the following is a specification.

This invention relates to a wave motor of that class wherein the power is derived from the rise and fall of a floatable body on the waves. In all efforts to derive power from such rise and fall that I have observed in practical operation, reliance has been placed on a strong mooring of the floatable body to the sea bottom the power being derived from the tension on the mooring. Such a device necessitates, in tidal waters, a provision to compensate for the rise and fall of the tide and practically prevents the vessel or the generator from moving off quickly to avoid bad weather.

My effort has therefore been to attain the desired result of a usable tension due to the rise of the floatable body on the waves by suspending from that floatable body one or more submerged bodies so designed that they will fall freely through the water during the downward movement of the floatable body as it descends into the trough of the waves but that will resist upward movement as it rises to the crest.

The invention is particularly described in the following specification, reference being made to the drawings by which it is accompanied, in which:

Figure 1 is a vertical section through the device, Fig. 2, a plan of the submerged body, and Fig. 3 shows in elevation an alternative form of the submerged body.

In these drawings 2 represents a floatable vessel which may be of any appropriate form or dimension that will offer a sufficient measure of buoyancy and that will rise and fall freely on the wave. From this buoyant vessel 2 is suspended by a flexible connection 3 a submerged body 4 the connection being preferably made to a central stem 5 projecting upward from 4 so that the tension of the connection will maintain the body 4 in its normal upright position.

In order to obtain the desired tension on the connection 3 as the vessel 2 rises on a wave it is necessary that the body 4 shall fall promptly through the water during the descent of the floatable body 2 so that during the period of rise there may be no slack in

the connection 3. This result is attained by forming the structure of the body 4 as a horizontally disposed open skeleton frame centrally arranged around the connection of the stem 5 to it and by covering this open frame with a series of closely connected valves 6 that will open freely upward so as to offer little or no resistance to downward movement but that will close immediately on an upward movement being made and will thus impose a strong resistance to such upward movement. The valves 6 are hinged to radial rods 6<sup>a</sup> by strip-like hinge members 6<sup>b</sup>, best shown in Fig. 2 of the drawings. To strengthen the resistance to upward movement an upwardly projecting rim 7 surrounds the body 4 which will prevent the water from passing too freely from the upper surface. This structure of the submerged body as an open frame covered with valves opening upward is an essential feature of this invention for, as before explained, unless every provision is made to facilitate descent of the submerged body 4 and to oppose resistance to its being lifted satisfactory results cannot be attained.

In the alternative design shown in Fig. 3 the frame of the submerged body is formed as a cone the valves being connected to the open skeleton frame as before. With this construction the valves will not require to open so far before attaining the vertical position and the natural tendency of the water off the slope of the cone during descent will be outward, while during upward movement the hollow cone will retain the water and offer a strong resistance.

Power may be derived from the tension of the connection 3 in any manner that may be convenient in the use to which it is to be applied.

In the drawing herewith the flexible connection 3 is shown as attached to a stem 10 having a crosshead 11 to which are secured downwardly directed plungers 12 of fluid force pumps 13 and on the stem 10 is a float 20 which will tend to maintain the crosshead 11 at the upper limit of its movement with the pump plungers 12 ready for a downward stroke under the pull of the connection 3 as the vessel 2 rises to a wave.

The full curved line in Fig. 1 shows the outline of the wave corresponding to the position of the mechanism shown in full lines and the curved dot and dash line, the outline of the wave as it would lift the float-

able body to the position shown by dot and dash lines and as having executed a full stroke of the pump plungers.

The water drawn into the pumps may be forced against a resisting pressure into a storage reservoir where it will be retained for use.

The particular manner by which the tension of the connection 3 is converted into usable power forms no material part of this invention which relates more particularly to the construction of the submerged body by which a usable tension is obtained.

The floatable body 2 may be of any particular form and may have any number of suspended submerged bodies. Where the length of the vessel is sensibly greater than the breadth it will be obviously advantageous to concentrate them as far as possible toward the extreme ends.

Having now particularly described my invention and the manner of its operation, I hereby declare that what I claim as new and desire to be protected in by Letters Patent is:

1. As a wave motor, the combination with a floatable body, of a submerged body flexibly connected to said submerged body and consisting of a horizontally disposed open frame, the surface of which is covered with valves opening upward, and means for deriving power from the tension of the flexible connection.

2. As a wave motor, the combination with a floatable body of a submerged body connected to it, said submerged body consisting of a horizontally disposed open frame cen-

trally arranged around a rigid stem to which the flexible connection is made, valves opening upward for closing the openings of the frame, and means for deriving power from the tension imposed on the flexible connection as the floatable body rises to a wave.

3. As a wave motor, the combination with a floatable body, of a submerged body flexibly connected to it, said submerged body consisting of a horizontally disposed open frame centrally arranged around a rigid stem to which the flexible connection is made, valves opening upward for closing the openings of the frame when the body is drawn upward, a raised border around the outside of the frame, and means for deriving power from the tension imposed on the flexible connection as the floatable body rises to a wave.

4. As a wave motor, the combination with a floatable body, of a submerged body flexibly connected therewith, said submerged body comprising an open frame uniformly disposed around a central stem to which the flexible connection is made, the exposed surface of the frame being formed as a series of valves opening upward, and means for deriving power from the tension on the flexible connection as the floatable body rises.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD L. AYERS.

Witnesses:

ROWLAND BRITAIN,  
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