

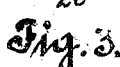
APPLICATION FILED MAY 13, 1909. RENEWED DEC. 12, 1911.

Patented May 6, 1913.

2 SHEETS—SHEET 1.



A. L. Mead Jr



James C. Lewis,

18th *Handwritten signature*

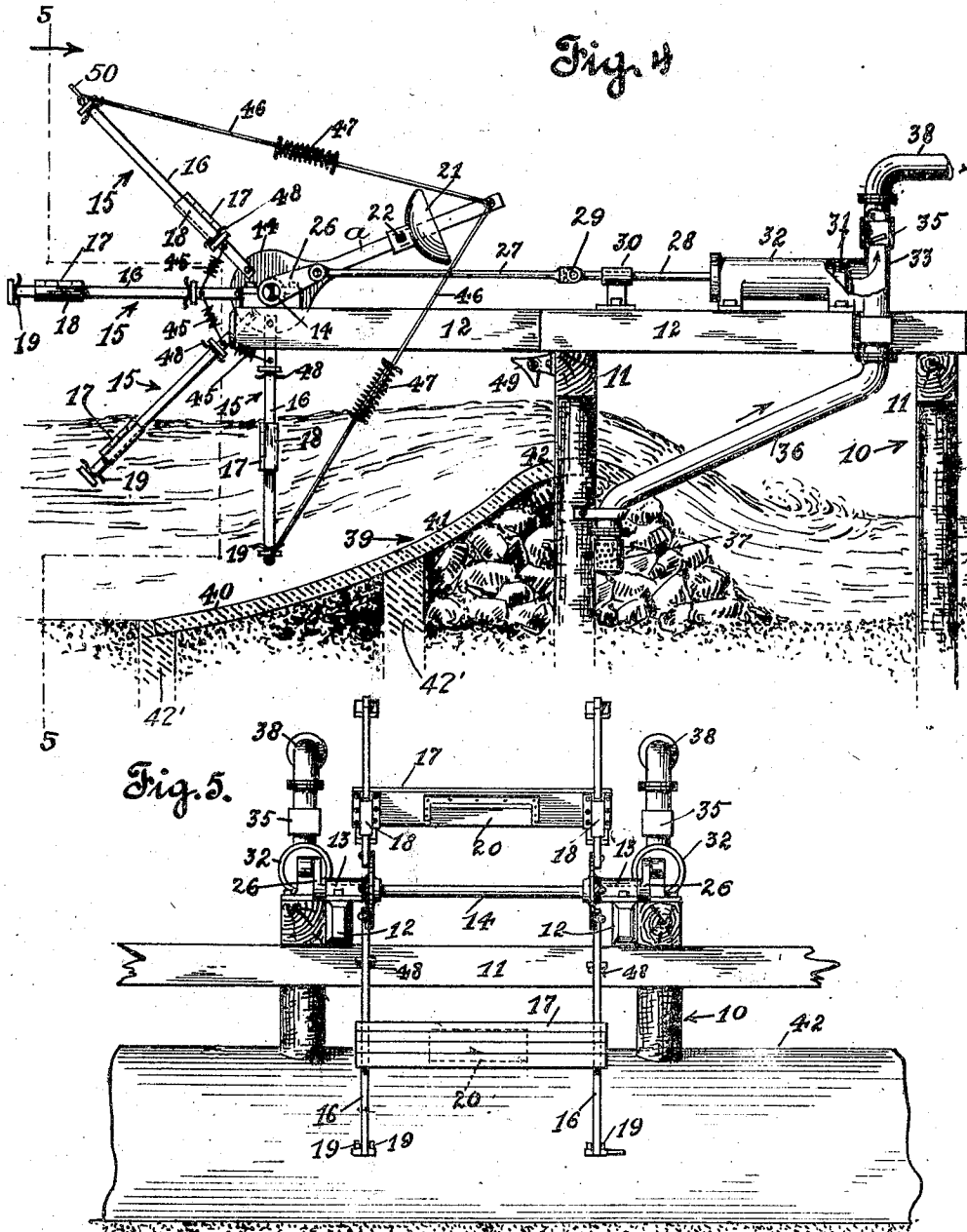
J. C. LEWIS.
WAVE MOTOR.

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UNITED STATES PATENT OFFICE.

JAMES C. LEWIS, OF LOS ANGELES, CALIFORNIA.

WAVE-MOTOR.

1,061,091.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed May 13, 1909, Serial No. 495,798. Renewed December 12, 1911. Serial No. 665,379.

To all whom it may concern:

Be it known that I, JAMES C. LEWIS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Wave-Motors, of which the following is a specification.

My invention relates to that type of wave motors in which a vane or paddle is pivotally suspended in the path of the wave travel from an extended super-structure, and is adapted to convert the force of the waves so as to operate a pump or other mechanism.

The primary object of my invention is to combine with the super-structure, which bears the paddle or vane, a sub-structure, which I term a wave deflector, of such configuration as to cause the wave to break thereon or thereover and to recede therefrom, so that the paddle is operated, not only by the incoming wave, but also by the recession of such wave.

If desired, in the practice of my invention I may provide a plurality of vanes or paddles arranged in the form of a segment of a paddle wheel, the supports of said vanes being connected together by relatively strong resilient members which will give sufficiently upon impact of the waves to prevent breaking the structure, and yet which will be sufficiently strong to operate the mechanism for converting the force of the waves.

Another object of my invention is to provide a catch on the super-structure which will engage with a vane and hold it clear of the waves in case of a severe storm, thus preventing the destruction of the device.

The above, and other novel features of my invention are disclosed in the accompanying drawings, in which:—

Figure 1 is a side elevation of my improved wave motor, the wave deflector thereof being shown in section. Fig. 2 is a front elevation of my wave motor in the position it assumes when hanging free. Fig. 3 is a section of the wave motor vane taken on line 3—3 of Fig. 2, seen from the rear. Fig. 4 is a side elevation of my device as it appears when constructed with a plurality of vanes. Fig. 5 is a front sectional elevation of the device shown in Fig. 4 taken on line 5—5 thereof.

Referring more specifically to the drawings, and at present to Figs. 1 and 2, it will

be seen that in the practice of my invention I make use of a wharf or other suitable structure 10 provided with platform 11 carrying freely extended arms 12. At the outer ends of arms 12 I provide suitable bearings 13 within which is journaled the shaft 14 bearing the wave motor vane which I have indicated generally by the reference numeral 15. Said motor 15 consists of arms 16 secured to shaft 14 which depend downwardly therefrom into the path of the wave travel, and carry at their lower end the motor vane 17. Said vane 17 is provided with guides 18 which slidably engage the arms 16. At the lower end of arms 16 I provide springs 19 which serve the dual purpose of forming a stop for vane 17, and at the same time a resilient cushioning means that prevents damage to the device if for any reason vane 17 should suddenly drop. Vane 17 is provided with a float 20 on the rear face thereof which serves to keep the vane always near the surface of the actuating wave whether it be in the flow or ebb. On the upper portions of arms 16 are carried counter-weights 21 which are fastened to the arms by any suitable means as is indicated generally by 22. These counter-weights serve to prevent any distortion of the device when in actual operation and cause it to have a smooth even motion. To render the motor vane more stable I provide my device with cross-arms 23 extending diagonally between arms 16. Arms 16 are keyed to shaft 14 by means of suitable set-screws or other fastening means 24. Secured to the outer ends of shaft 14 and closely engaging bearings 13, as indicated at 25, are suitable crank arms 26. Said arms 26 engage links 27 which in turn have pivotal connection with piston rods 28 as indicated at 29. Piston rods 28 are guided in suitable bearings 30 and terminate in piston heads 31 operating in cylinders 32. Cylinders 32 terminate in pipes 33 bearing check valves 34 and 35. Check valve 34 communicates by way of pipe 36 with a strainer 37 which is located below the normal water level. Check valve 35 communicates by way of pipe 38 with a suitable storage reservoir (not shown). 39 indicates what I term a wave deflector which is a weir built preferably of concrete and having an inclined surface 40 terminating in a curve 41 struck to an arc corresponding substantially to the radius of the swing of

the motor vane arms. Said curve 41 in turn terminates at its top in a short abrupt curve 42 struck to an arc inverse to that of the main body of the deflector. Said deflector is supported on suitable foundations 42'.

It will be seen by reference to Figs. 1 and 4 that the deflector surface projects into the sea bottom at its forward end, and in actual practice extends about three feet below low tide. It rises therefrom in an incline 40 and curve 41 as above described, thus leaving a recess thereunder. This recess may either be filled with coarse grouting, or if desired the sand may be allowed to collect therein, which in the practice of my invention actually takes place.

Referring now more specifically to that form of my device shown in Figs. 4 and 5, it will be seen that I have provided a plurality of motor vanes 15, and unite them pivotally with hubs 44 secured to shaft 14. Between said motor vanes I interpose springs 45 which are designed to take up any sudden shock that would tend to break said motor vanes. To form stays for said motor vanes I attach cables or other suitable staying means 46 to the outermost of said vanes and run them to the upper portions of arms 4. I interpose strong springs 47 in said stays. Since vanes 17, when the waves are running high, are liable to slide with considerable force toward the hubs 44, I have provided arms 16 with springs 48 to take up the shock. In case of a severe storm, it may be expedient to secure the vanes out of the path of the waves, and for this purpose I have provided the catch 49 adapted to engage a finger 50 on one of the vanes 16 to hold all of the vanes out of the path of wave travel until the storm shall have subsided.

The operation of my improved wave motor is as follows: The normal position of the motor vanes being perpendicular when the device is not operating, it will be seen that when an inwardly moving wave strikes a vane, it will carry the same landward, float 20 on said vane causing it to always ride near the top of the wave. The incoming waves will strike the surface 39 and be deflected upward, and since the curvature of said surface is practically the arc of the swing of the vane, it will be seen that said vane will be given a very long stroke. As soon as the wave breaks its recession will carry the vane back therewith, thus it will be seen that I have provided means for utilizing not only the flow of wave, but also the ebb thereof.

The operation of my device disclosed in Figs. 4 and 5 is substantially that set forth above with this exception; when the first landward arm is engaged it immediately starts to move landward, thus pulling the next vane into position to be engaged by

the wave, and so on until the wave has spent its force. As soon as the wave has spent its force on the last seaward arm and starts to recede, it will engage the vane on said seaward arm, carrying it seaward, which in turn will pull another vane into position, thereby utilizing the maximum amount of the force of the ebb. From the above it will be seen that by means of the device illustrated in Figs. 4 and 5, I practically double the stroke of the crank shaft.

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

1. In a wave motor, the combination of a pivoted motor element suspended in the path of wave travel, and a curved wave deflector, the principal curve thereof approximating the arc of the radius of swing of said motor element.

2. In a wave motor, the combination of a pivoted buoyant motor element suspended in the path of wave travel, and a curved wave deflector, the principal curve thereof approximating the arc of the radius of swing of said motor element.

3. In a wave motor, the combination of pivoted arms, a buoyant motor element slidingly mounted on said arms in the path of wave travel, and a curved wave deflector, the principal curve thereof approximating the arc of the radius of swing of said arms.

4. In a wave motor, the combination of a plurality of motor arms rigidly secured to a pivoted shaft, said arms each having a buoyant motor element slidingly mounted thereon and adapted to be suspended in the path of wave travel, and a curved wave deflector, the principal curve thereof approximating the arc of the radius of swing of said arms.

5. In a wave motor, the combination of a pivoted motor element suspended in the path of wave travel, and a wave deflector comprising a surface curved to approximately the arc of the radius of swing of said motor element and terminating in a seaward surface substantially tangential thereto.

6. In a wave motor, the combination with a supporting structure, placed at a distance from the shore line, of a shaft supported on said structure, a plurality of arms rigidly secured thereon and extending on either side of said shaft, a buoyant paddle mounted on said arms, adjustable counter-weights secured to the opposite end of said arms, and a wave deflector terminating at an abrupt angle beyond the path of the swing of said arms, whereby the waves are carried by said structure in the actuation of said paddles.

7. In a wave motor, the combination with a supporting structure, placed at a distance from the shore line, of a shaft supported on said structure, a plurality of arms rigidly secured thereon and extending on either side

of said shaft, a buoyant paddle mounted
on said arms, adjustable counter-weights se-
cured to the opposite end of said arms, and
a wave deflector having an inclined surface
5 directed outwardly from said shore line and
provided with a curved surface struck by
the radius on said shaft terminating in an
inverse curve beyond the inward swing of
said arms, the termination of said incline be-

ing in a plane above the lower edge of said 10
inclined arms.

In witness that I claim the foregoing I
have hereunto subscribed my name this 1st
day of May, 1909.

J. C. LEWIS.

Witnesses:

T. L. MEAD, Jr.,
E. A. STRAUSE.