

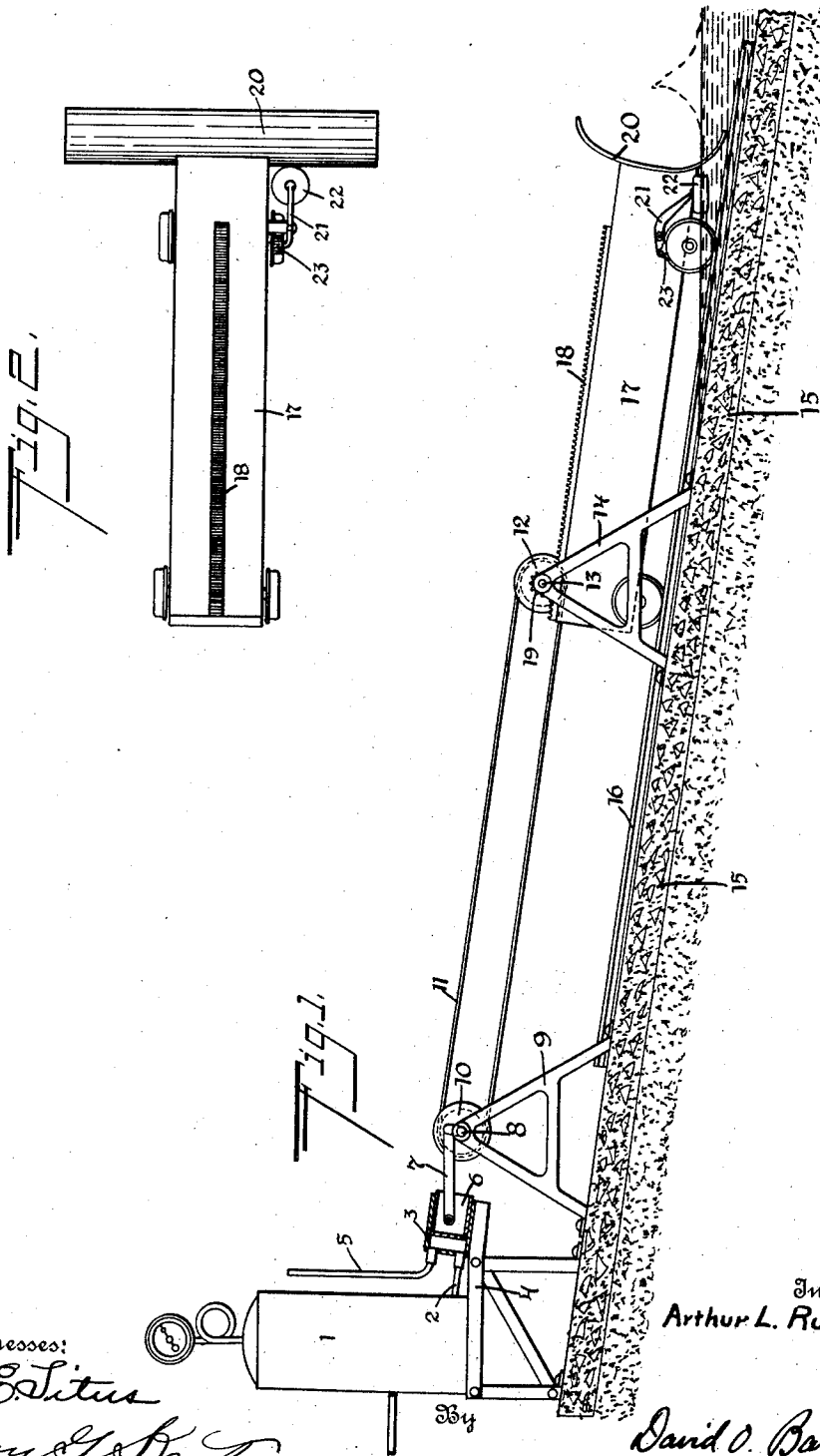
A. L. RUNYAN.
WAVE ENGINE.

APPLICATION FILED JAN. 29, 1912.

Patented Nov. 5, 1912.

2 SHEETS—SHEET 1.

1,043,732.



Witnesses:

J. E. Titus
Roy E. Shatz

Inventor,
Arthur L. Runyan.

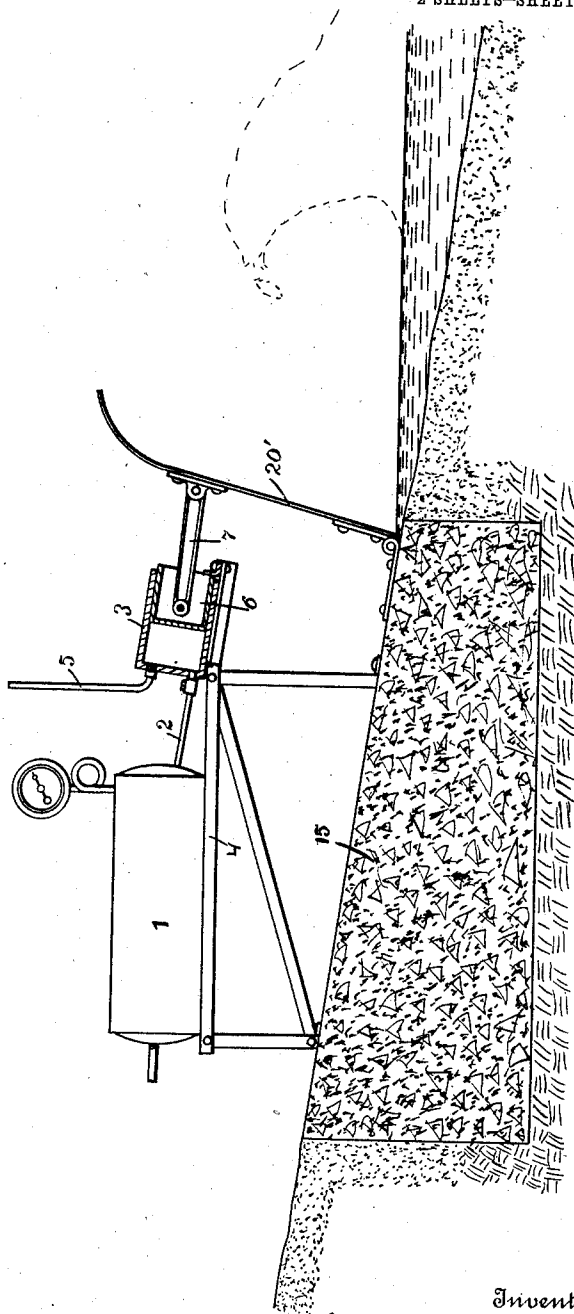
David O. Bamell
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UNITED STATES PATENT OFFICE.

ARTHUR L. RUNYAN, OF HURON, SOUTH DAKOTA.

WAVE-ENGINE.

1,043,732.

Specification of Letters Patent.

Patented Nov. 5, 1912.

Application filed January 29, 1912. Serial No. 674,566.

To all whom it may concern:

Be it known that I, ARTHUR L. RUNYAN, a citizen of the United States, and a resident of Huron, in the county of Beadle and State of South Dakota, have invented certain new and useful Improvements in Wave-Engines, of which the following is a specification.

My invention relates to power mechanism for storing and utilizing the energy of the waves on large bodies of water.

It is the object of my invention to provide a simple and durable mechanism for utilizing the kinetic energy of the water in waves to actuate a reciprocating mechanical element and to store said energy in a static form by compressing air into a suitable container.

A further object of my invention is to provide automatic means for keeping the reciprocating element in a uniform relation to the normal surface of tidal waters.

Constructions embodying my invention are illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the mechanism, partly in section, Fig. 2 is a plan view of the apron-carriage, and Fig. 3 is a side view, partly in section, of a modified form of the mechanism, as adapted for use on tideless bodies of water.

Referring to the structures shown in Figs. 1 and 2, I provide a suitable air-storage reservoir 1, with which is connected the valved discharge-pipe 2 of an air-compressor cylinder 3 which may be fixedly mounted on the frame 4 which supports the reservoir 1. The cylinder 3 is provided with a valved intake-pipe 5, as shown. A piston 6 disposed in the cylinder has a connecting-rod 7 which extends to a crank formed on a shaft 8 journaled in suitable bearings on a frame 9. The crank-shaft 8 has a wheel 10 thereon which is connected by means of an endless belt 11, or the like, with a similar wheel 12 carried on a shaft 13 which is journaled in a frame 14. The frames 4, 9 and 14 are preferably supported on an inclined concrete foundation 15 which is extended below the low-water level of the body of water which is utilized to operate the engine. On the said inclined foundation are secured rails 16 on which is placed a wheeled carriage 17. On the upper side of the carriage 17 is a longitudinally extending rack

18 which meshes with a pinion 19 carried on the shaft 13, so that movement of the carriage along the track will cause rotation of said shaft. At the lower end of the carriage is a plate or apron 20 of which the main portion is approximately vertical and the upper and lower edges are curved outwardly, as shown. On the side of the carriage body 17 is a pivoted lever 21 at one end of which is carried a float 22. The opposite end of the lever carries a brake-shoe 23 adapted to bear against one of the wheels of the carriage.

The operation of the mechanism will be apparent by reference to Fig. 1, which shows the position of the parts when the water is perfectly calm and at low tide. A wave approaching the shore line, as indicated by the dotted lines, strikes the apron 20 and the impact thereof causes the carriage to move up the track thereby causing rotation of the shaft 13 which, in turn, drives the crank-shaft 8 and causes a reciprocating movement of the piston 6. As the force of the wave is exhausted the carriage actuated by gravity moves down the track until the float 22 reaches the water level and is lifted to apply the brake 23 to the carriage wheel. The movement of the carriage is thus stopped when the apron has reached the proper relation to the normal or calm water-level. As the tide comes in and the water-level is thereby raised the carriage will be stopped successively at higher positions on the track and as the tide goes out the stopping positions of the carriage will be progressively lower on the track. The carriage is thus maintained in a uniform relation to the water-level.

In the modified form of the mechanism shown in Fig. 3 all of the connecting mechanism between the connecting-rod 7 and the wave-impact-receiving apron is omitted and the lower side of the apron 20' is pivotally connected with the foundation 15. The apron is also inclined slightly away from the cylinder 3 so that the weight of the apron will tend to cause it to move outward and to pull the piston toward the open end of the cylinder 3. Then when a wave strikes the apron the upper part thereof swings inwardly and the air in the cylinder is compressed and driven through the valved discharge-pipe 2 into the reservoir 1.

Now, having described my invention, what

I claim and desire to secure by Letters Patent is:

1. In a wave engine, a wave-impact-receiving apron, a wheeled carriage carrying the apron, an inclined track on which the carriage is disposed, and a float-controlled brake for stopping movement of the carriage along the track at a predetermined relation to a water-level.
2. In a wave engine, an inclined track having its lower end extended below a low-tide water-level, a carriage movable along said track, wave-impact-receiving means on said carriage, a shaft revoluble on a fixed axis, connecting driving means between the carriage and said shaft, a brake arranged on the carriage, and a float controlling said brake.
3. In a wave engine, a movable wave-im-

pact-receiving body arranged so as to be moved up an inclined path by the impact of waves thereon and to move downward along said path by the force of gravity, air-compressing and storing means, connecting driving means between the wave-impact-receiving body and the air-compressing means, and means for automatically gaging the lower stopping position of the wave-impact-receiving body relative to the wave-source.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

ARTHUR L. RUNYAN.

Witnesses:

D. O. BARNELL,
J. E. TITUS.

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