UNITED STATES PATENT OFFICE.

EMIL RAHM, OF ZURICH, SWITZERLAND.

INSTALLATION FOR UTILIZING THE ENERGY OF SEA WAVES.


To all whom it may concern:

Be it known that I, EMIL RAHM, a citizen of the Republic of Switzerland, residing at Zurich, Switzerland, have invented certain new and useful Improvements in an Installation for Utilizing the Energy of Sea Waves, of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention consists in an installation for utilizing the energy of sea waves which works with a high efficiency even when the waves are comparatively small.

The device according to the present invention comprises weighted cars adapted to move along rails arranged on a floating structure such as a pontoon, boat, raft etc., the movement of the cars being caused by the raising and lowering of the longitudinal ends of the floating structure, i.e., by the pitching movement, whereupon the cars run along the inclined rails, further a longitudinally disposed shafting being provided with an operative connection between the weighted cars and the shafting whereby the movement of the cars along the rails imparts rotation to the shaft.

A constructional example of the device according to the invention is illustrated on the accompanying drawings, in which:

Fig. 1 is a vertical longitudinal section through the device along line I—I in Fig. 2.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a cross-section along line III—III in Fig. 1.

Fig. 4 is a cross-section along line IV—IV in Fig. 1.

Figs. 5 and 6 show a detail on an enlarged scale.

Referring now to the drawings, 1 denotes the floating structure, for instance a pontoon, which is provided with rails 2 and 3 arranged in the longitudinal direction of the pontoon. Two weighted cars 4 and 5 having flanged wheels 6 for running on said rails 2 and 3 are connected together by channels 7 and 8 to move in unison. Each car is further provided with a buffer 9 and 10 respectively on which the spiral springs 11 act for limiting the travel of the cars in a resilient manner, the buffers 9 and 10 respectively co-operating with the stationary buffers 12 and 13 respectively provided on the pontoon. On the top the cars are provided with a double flanged guide wheel 14 running along the guide rail 15 fixed to the underside of the deck 16 of the pontoon. 17 and 18 denote the parts of the shaft passing freely through the cars and provided with a right hand and left hand spiral groove 19 respectively; the shaft parts 17 and 18 are connected together by means of an intermediate shaft 20 on which a fly-wheel 21 is fixed. The shafting is rotatably mounted in bearings 22 and 23, preferably designed as thrust bearings, and in the bearing standards 24 and 25. On the intermediate shaft 20 there is further fixed a gear wheel 26 meshing with a gear wheel 27 on a countershaft 28 rotatably mounted in the standards 24 and 25. A belt pulley 29 is fixed to the countershaft 28 and a belt pulley 30 on the shaft of the electric machine 32, a tension pulley 31 being arranged for tightening the belt 30.

The means for operatively connecting a weighted car to its respective shaft comprise a free wheel mechanism shown in detail in Figs. 5 and 6. A nut 33 engages with the spiral groove 19 of the shaft part 17 or 18 respectively. On the outer periphery of the nut there is loosely mounted a bush 34 secured against a displacement in the axial direction by the nuts 35, 36 and the flanged portion 37 of the nut 33. The bush 34 widens out at one end and is provided with teeth or serrations 38 arranged on the inner circumference, pawls 39 co-operating with said teeth are rotatably mounted on pins 40 screwed in the flanged portion 37 of the nut 33; springs 40 press the pawls 39 towards the teeth 38. Integral with the bush 34 are two gudgeons 41, 42, which form the pivot connections of levers 43, 44 turnably mounted on pins 45, 46 fixed to a car 4 or 5 respectively. The levers 43 and 44 extend beyond the pins 45 or 46 and have forked ends...
floating structure adapted to carry g3 47 provided with slots 48 into which pins 49 project. The pins 49 are fixed to sleeves 50 slidably arranged on vertical rods 51 and resiliently held in a mid position by the 5 spiral springs 52 and 53. This operative connection between the shaft parts and the cars permits a safe working of the installation even when the shafting and the rails are out of alignment. The pontoon can be anchored by means of a chain 54 to prevent it from drifting away.

The working of the above described device is as follows: The waves will cause an alternate raising and lowering of the ends of the pontoon so that the rails 2 and 3 will be inclined alternately towards one end and towards the other. The cars will then move down the inclined rails and will thereby cause a rotation of the shafting. When, for instance, the right hand end of the pontoon in Fig. 1 has been raised the cars 4 and 5 have moved towards the left into their final position indicated in Fig. 1. During this movement the nut 33 operatively connected to the car 4 has caused a turning of the shaft part 17 in the clockwise direction while the nut 33 operatively connected to the car 5 has been inoperative causing the free wheel mechanism to act. If now the cars move in the opposite direction the nut 33 operatively connected to the car 5 will turn the shaft part 18 in the clockwise direction and the free-wheel mechanism connected to the car 4 becomes active and so on. The fly-wheel 21 causes the shafting to turn during short intervals between the longer or shorter movements of the cars, so that on a comparatively rough sea a continuous generation of electric current is attained.

Instead of an electric generator any other machine may be driven by the shaftings.

I claim: 1. An installation for utilizing the energy of sea waves comprising in combination a floating structure adapted to carry out pitching movements under the influence of the waves, rails arranged on said floating structure, cars adapted to run on said rails, a shafting having spiral grooved parts disposed parallel to said rails, operative connections between said spiral grooved shaft parts of the shifting and the cars, whereby the movement of the cars along the rails causes a turning motion of the shafting, and a machine driven from said shafting and absorbing the energy thus derived from the sea waves.

2. An installation for utilizing the energy of sea waves comprising in combination a floating structure adapted to carry out pitching movements under the influence of the waves, rails arranged on said floating structure, two heavily weighted cars connected together and adapted to run along said rails when the latter are inclined during the pitching movements, a shafting comprising a part provided with a left hand spiral groove and a part provided with a right hand spiral groove, said parts disposed parallel to said rails, operative connections between one of said spiral-grooved shaft parts and one of said cars and between the other shaft part and the other car, whereby the movement of the cars along the rails causes a turning movement of the shafting, and a machine driven from said shafting and absorbing the energy thus derived from the sea waves.

3. An installation for utilizing the energy of sea waves comprising in combination a floating structure adapted to carry out pitching movements under the influence of the waves, rails arranged on said floating structure, two heavily weighted cars connected together and adapted to run along said rails when the latter are inclined during the pitching movements, a shafting comprising a part provided with a left hand spiral groove and a part provided with a right hand spiral groove, said parts disposed parallel to said rails, operative connections provided with free wheel mechanism and interposed between one of said spiral grooved shaft parts and one of said cars and between the other shaft part and the other car, whereby the movement of the cars along the rails causes a turning movement of the shafting, and a machine driven from said shafting and absorbing the energy thus derived from the sea waves.

4. An installation for utilizing the energy of sea waves comprising in combination a floating structure adapted to carry out pitching movements under the influence of the waves, rails arranged on said floating structure, two heavily weighted cars connected together and adapted to run along said rails when the latter are inclined during the pitching movements, a shafting comprising a part provided with a left hand spiral groove and a part provided with a right hand spiral groove, said parts disposed parallel to said rails, operative connections between one of said spiral grooved shaft parts and one of said cars and between the other shaft part and the other car, whereby the movement of the cars along the rails causes a turning motion of the shafting, and a machine driven from said shafting and absorbing the energy thus derived from the sea waves.
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5. An installation of the character described comprising a floating structure, cars mounted in and reciprocable longitudinally of the structure by the movements of the latter, a spirally grooved shafting extending longitudinally of the structure, operative connections between said shafting and cars whereby the movements of the latter impart rotation to the shafting, and mechanism operated by the rotation of the shafting.

In testimony whereof I affix my signature.

EMIL RAHM.