No. 659,609. Patented Oct. 9, 1900.

J. J. McINTYRE.

WAVE AND TIDAL ENGINE.

(Application filed Nov. 7, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

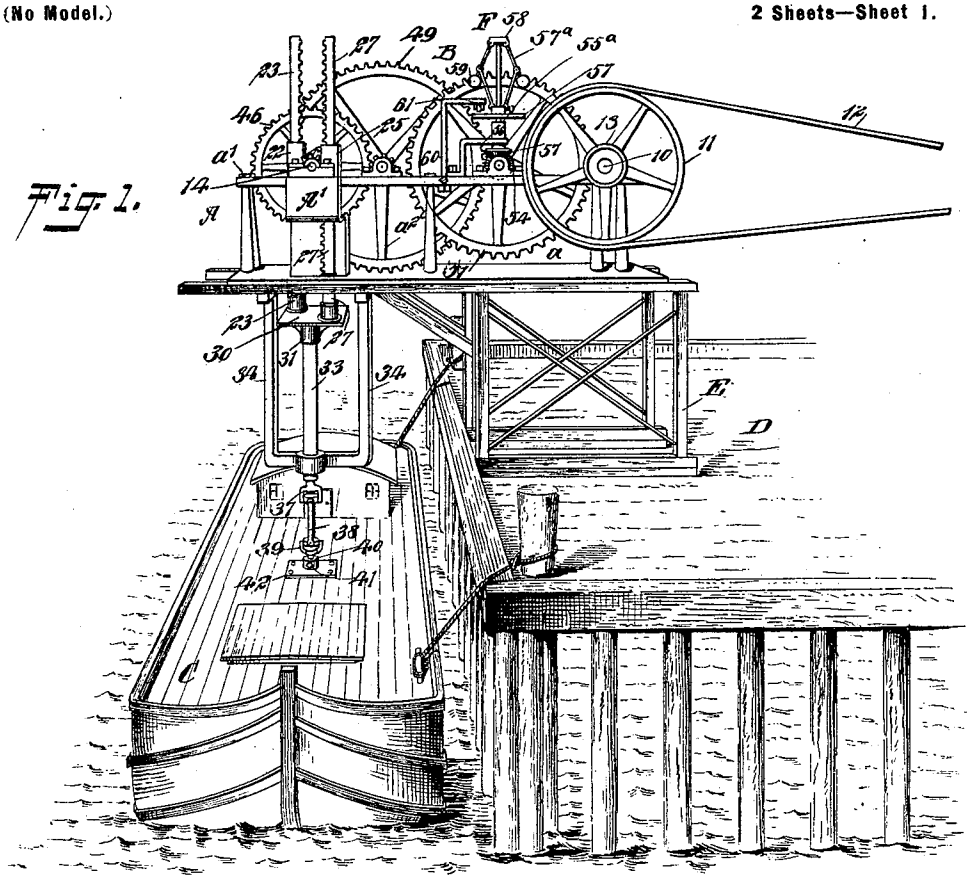
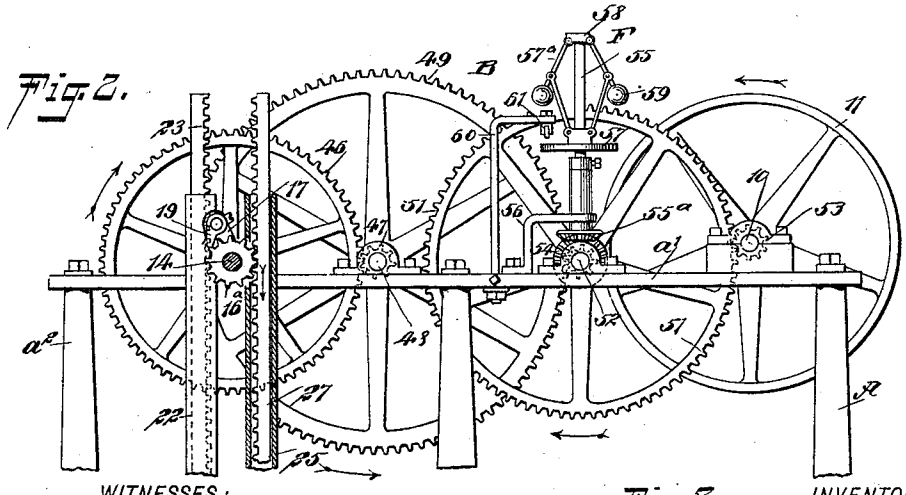


Fig. 2.

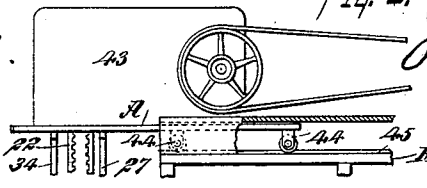


WITNESSES:

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Fig. 3.



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Fig. 3.

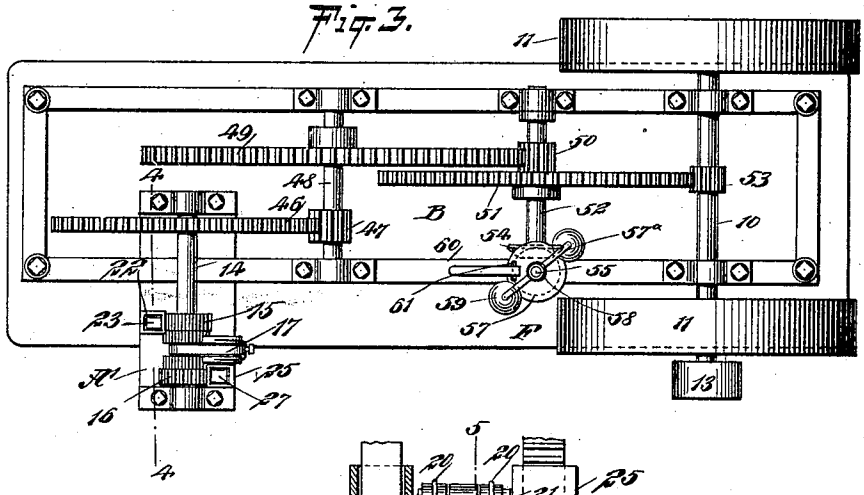


Fig. 4.

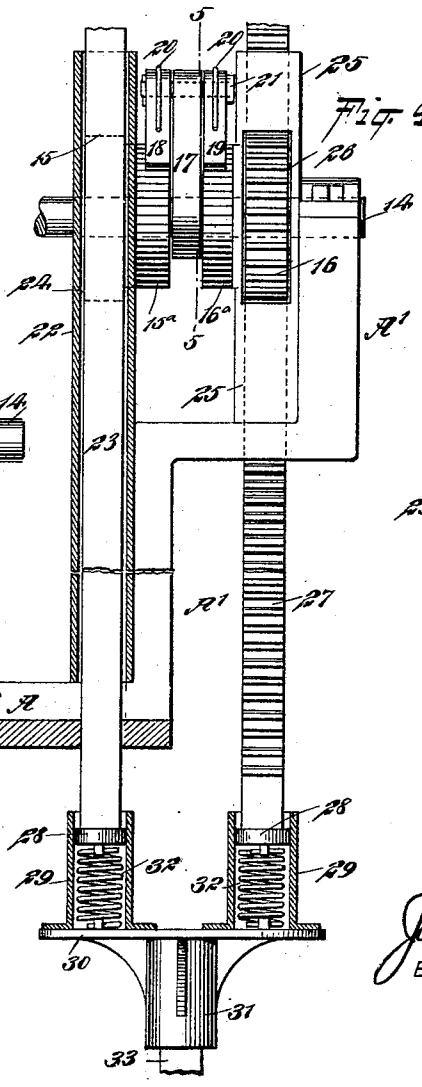


Fig. 5.

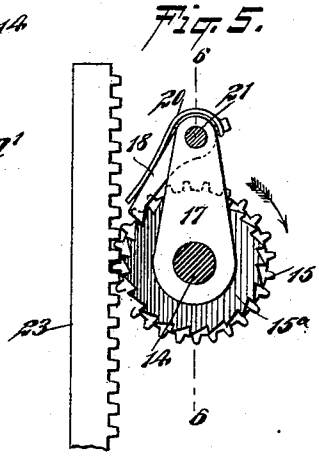


Fig. 6.

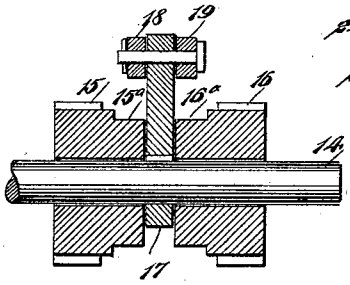
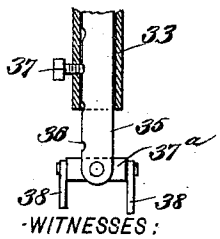


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSEPH J. McINTYRE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO THOMAS A. ENNIS, OF SAME PLACE.

WAVE AND TIDAL ENGINE.

SPECIFICATION forming part of Letters Patent No. 659,609, dated October 9, 1900.

Application filed November 7, 1899. Serial No. 736,160. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH J. McINTYRE, a citizen of the United States, residing at the city of New York, borough of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Wave and Tidal Engine, of which the following is a full, clear, and exact description.

One object of the invention is to provide a simple yet effective power device adapted to be placed upon or over a wharf or other structure adjacent to or extending over a body of water or upon the shore, which device is operated without interruption by the rise and fall of the tide and is so constructed that the power derived from the rise and fall of the water will be multiplied and communicated in its multiplied form to a shaft from which power may be taken.

Another object of the invention is to so construct the machine that it may be connected with the deck of a boat or a float of any description and readily disconnected therefrom, the connection being so made that the vessel may careen, rock, or toss without interrupting the operation of the machine and without injury to any part of its structure.

Another object of the invention is to provide means whereby the machine may be situated at a dock without materially detracting from the working surface of the dock and whereby the machine if normally extending over an end or a side of the dock may be readily moved inboard while an elevator or large vessel is being docked.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the machine, parts being in perspective view and illustrating its attachment to a boat. Fig. 2 is a side elevation of the machine, parts being in section and drawn upon a larger scale than shown in Fig. 1. Fig. 3 is a plan view of the machine. Fig. 4 is a section taken practically on the line 4 4 of Fig. 3, showing the rack mechanism partially in side elevation and partially in section. Fig. 5 is a section taken practically on the line 5 5 of Fig. 4. Fig. 6 is a section taken practically on the line 6 6 of Fig. 5. Fig. 7 is a detail sectional view of the telescopic connection between the power-conducting rod and the device adapted for attachment to a floating object, and Fig. 8 is a side elevation of a modified construction.

The frame A, as illustrated, consists of a base-plate a and upper rails a', connected with the base-plate by uprights a^2; but the character of the frame may be changed as desired. The shaft 10, from which power is to be taken, is journaled in any approved manner at one end portion of the frame. Two fly-wheels 11 are mounted on this shaft, one at or near each end, and one of the fly-wheels 11 may be connected by a belt 12 with any source to which power is to be communicated, and a smaller pulley 13 is likewise carried by the power-shaft 10, over which a belt may be carried when the speed is to be changed. A shaft 14 is located at the opposite end of the frame, which shaft is a drive-shaft, and this shaft is journaled partly upon the frame and partly in a bracket A', which extends beyond one side of the frame. This shaft 14 carries two loosely-mounted gears 15 and 16. The gear 15 is provided upon its outer face with an attached ratchet-wheel 15^a, while the gear 16 is provided with a similar ratchet-wheel 16^a upon its inner face. Thus the two ratchet-wheels 15^a and 16^a are opposite each other, as shown in Fig. 6. The teeth of these ratchet-wheels are inclined in the same direction and they may be either an integral portion of the gears 15 and 16 or may be secured thereto in any suitable or approved manner.

A crank-arm 17 is located between the ratchet-wheels 15^a and 16^a, as shown in Figs. 4 and 6. This crank-arm is secured to the shaft 14, turning therewith, and carries two pawls 18 and 19, located one at each side, both pawls extending in the same direction, and these pawls are held in engagement with the ratchet-wheels 15^a and 16^a by means of springs 20, likewise carried by the crank-arm 17, and the pawls 18 and 19 are supported on the crank-arm by a suitable pivot-pin 21.

The drive-shaft is actuated through the

medium of the following mechanism: A vertical tubular guide-casing 22 is located opposite the front surface of the gear 15 on the drive-shaft, the lower end of the guide-casing 22 being in communication with an opening in the base of the frame A. This guide-casing 22 is provided with an opening 24 in the face which is opposite the gear 15 to receive the said gear, as shown in dotted lines in Fig. 4, so that the gear 15, as illustrated in Fig. 5, will mesh with the teeth of a rack 23, movable in the casing 22. A second guide-casing 25 is supported on the bracket A', this casing being located at the rear side of the gear 16 on the drive-shaft 14, and the guide-casing 25 is provided with an opening 26, through which the gear 16 extends and engages the teeth of a rack 27, movable in the casing 25, the teeth of which rack face inwardly or in an opposite direction to the teeth of the opposing rack 23. These racks extend one below the bracket A' and the other below the base of the frame A, and each rack at its lower end is preferably provided with a head 28, which heads enter and slide in sockets 29, constructed upon the upper face of a table 30, which table is also provided at its under face with a central socket 31, as illustrated best in Fig. 4. Springs 32 are located in the upper sockets 29, having bearing upon the table and against the heads 28 of the racks 23 and 27, being preferably connected with the said racks, so that any sudden upward or downward jar will not be communicated in any detrimental manner to the racks and the gears with which they engage.

A power-conducting rod 33, which is preferably tubular, is secured at its upper end in the lower socket 31 of the table 30 by a ball or knuckle joint, if desired, and this power-conducting rod 33, as shown in Fig. 1, is guided at its bottom by being passed through a yoke 34, pendent from the under side of the base of the frame A. Preferably a bar 35 is mounted to slide in the tubular conducting-rod 33, being adjustable or telescopic therein, and this rod may be held in adjusted position in any suitable or approved manner, one means being illustrated in Fig. 7, wherein the rod is provided with a series of recesses 36, any one of which is adapted to receive a set-screw 37, passed through the power-conducting rod 33, and the connected rod 35 is provided with a swivel 37^a at its lower end. This swivel 37^a is connected with a lower swivel 39 in a pivotal manner through the medium of links 38. The lower swivel 39 is pivotally connected with a post 40, which post is adjustably and removably located in a collar 41, formed upon a plate 42 or its equivalent, as shown in Fig. 1, the said plate being adapted for attachment to the deck of a vessel or to any other convenient portion of its structure.

As shown in Fig. 1, the vessel C, to which the attachment is made, may be tied up at the wharf D, upon which the machine is placed, that portion of the frame carrying the racks being placed over the water. It is obvious that when the racks are connected with a vessel in the manner described—namely, through the swivels and the plates and the power-conducting rod—no matter whether the vessel rolls, tosses, or careens such motion will have no effect on the vertical alinement of the racks, and the operation of the racks will be carried on in a perfect manner through the rise and fall of the vessel, the waves acting in the same way as the tide. It is also obvious that instead of a vessel being employed to communicate motion to the racks through the rise and fall of the tide a float of any description may be employed, and that the float may be placed either adjacent to or under a dock, and that the float may be constructed after the pattern of a catamaran.

In the drawings the base of the machine is shown as supported on the dock D through the medium of a scaffold E; but any well-known means may be employed to the same end. It is evident that by placing the racks 23 and 27 as shown—namely, facing each other—and engaging the racks with independent pinions adapted either one or the other to communicate motion to the drive-shaft the drive-shaft will be turned in the same direction no matter whether the racks are carried upward or downward. When the racks, for example, are carried upward, the rack 23 will turn its gear 15 in such direction as to turn the shaft, since the pawl 18 will remain in engagement with a single tooth on the ratchet-wheel 15^a, while the opposite rack in ascending will turn its ratchet-wheel 16^a in an opposite direction, and consequently the pawl 19 will simply slip over the ratchet-wheel 16^a of the gear 16, and this latter gear will have no effect whatever on the shaft. A reverse operation is true when the racks move in a downward direction.

The mechanism above the base may be placed within a casing, as shown in Fig. 8, and the base may be provided with wheels 44, traveling on tracks 45 on the scaffold E, so that the device may be drawn inward or carried outward, and thus be taken out of the way of vessels approaching the dock or leaving the same.

The shaft 14 is connected with the shaft 10 through the medium of a multiplying train of gearing B. This gearing consists of a large wheel 46, which is secured to the inner end of the drive-shaft 14 and meshes with a pinion 47 on an intermediate shaft 48, which intermediate shaft carries an exceedingly large gear 49, and this gear in its turn meshes with a pinion 50 on a second intermediate shaft 52, which second intermediate shaft carries a gear 51, larger than the gear 46, but smaller than the gear 49, and this latter gear 51 meshes with a pinion 53 on the power-shaft 10; but it will be understood that the train of gearing may be added to until the desired amount of power or speed is obtained at the shaft 10.

In connection with the train of gearing I employ a governor F. This governor consists of a shaft 55, which is mounted to revolve in a bracket 56, shown as secured to one of the rails a' of the frame A. Arms 57^a are pivoted or otherwise attached to a table 57, mounted to slide on the shaft 55, and to a cap 58, secured to the upper end of the shaft, each of the arms 57^a being provided with a ball 59. Thus when the speed has reached its maximum the table 57 will have been drawn up a certain distance; but it cannot ascend higher by reason of being brought in engagement at that time with a wheel 61, carried by a standard 60, secured to the frame, the said wheel being held over the sliding table 57. The speed may be regulated by adjusting the standard 60 by the application thereto of a set-screw or the like, so that the roller of the standard 60 may be brought in any desired relation to the governor-table 57. The governor is usually operated by placing a bevel-gear 54 on the intermediate shaft 52, which bevel-gear 54 meshes with a like gear 55, located on the lower end of the governor shaft or stem.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a wave and tidal engine, a drive-shaft, gears loosely mounted upon the shaft, ratchet connections between the gears and shaft, and racks connected at their lower ends and engaging with different gears at opposite faces, a power-conducting rod connected with both racks, said rod being provided with telescopic and with swivel sections, and means for attaching the swivel-sections to an object capable of floating on the water, as described.

2. In a wave and tidal engine, a drive-shaft, gears loosely mounted on the shaft, means for operatively engaging the gears with the shaft, racks engaging with the gears, a float, a telescopic rod connecting with the racks, and spring yielding connections between said rod and the float, substantially as specified.

3. In a wave and tidal engine, a drive-shaft, pinions loosely mounted on the shaft, racks engaging with the pinions at opposite sides of the shaft, ratchet-wheels attached to the pinions, a crank-arm on the shaft between the ratchet-wheels, pawls carried by the crank-arm and engaging with the ratchet-wheels both on the same side of the shaft, a telescopic and swivel section rod connecting with both racks, a float connected to the said rod, and a chain of gearing operated from the drive-shaft, substantially as specified.

4. In a wave and tidal engine, a drive-shaft, pinions loosely mounted on the shaft, racks engaging with the pinions at opposite sides of the shaft, ratchet-wheels attached to the pinions, a crank-arm on the shaft between the ratchet-wheels, pawls carried by the crank-arm and engaging with the ratchet-wheels both on the same side of the shaft, a telescopic rod having connection with both of the racks, a float, a spring connection between said rod and the float, a chain of gearing operated from the drive-shaft, and a governor for the chain of gearing, substantially as specified.

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

JOSEPH J. McINTYRE.

Witnesses:
F. W. HANAFORD,
EVERARD BOLTON MARSHALL.