

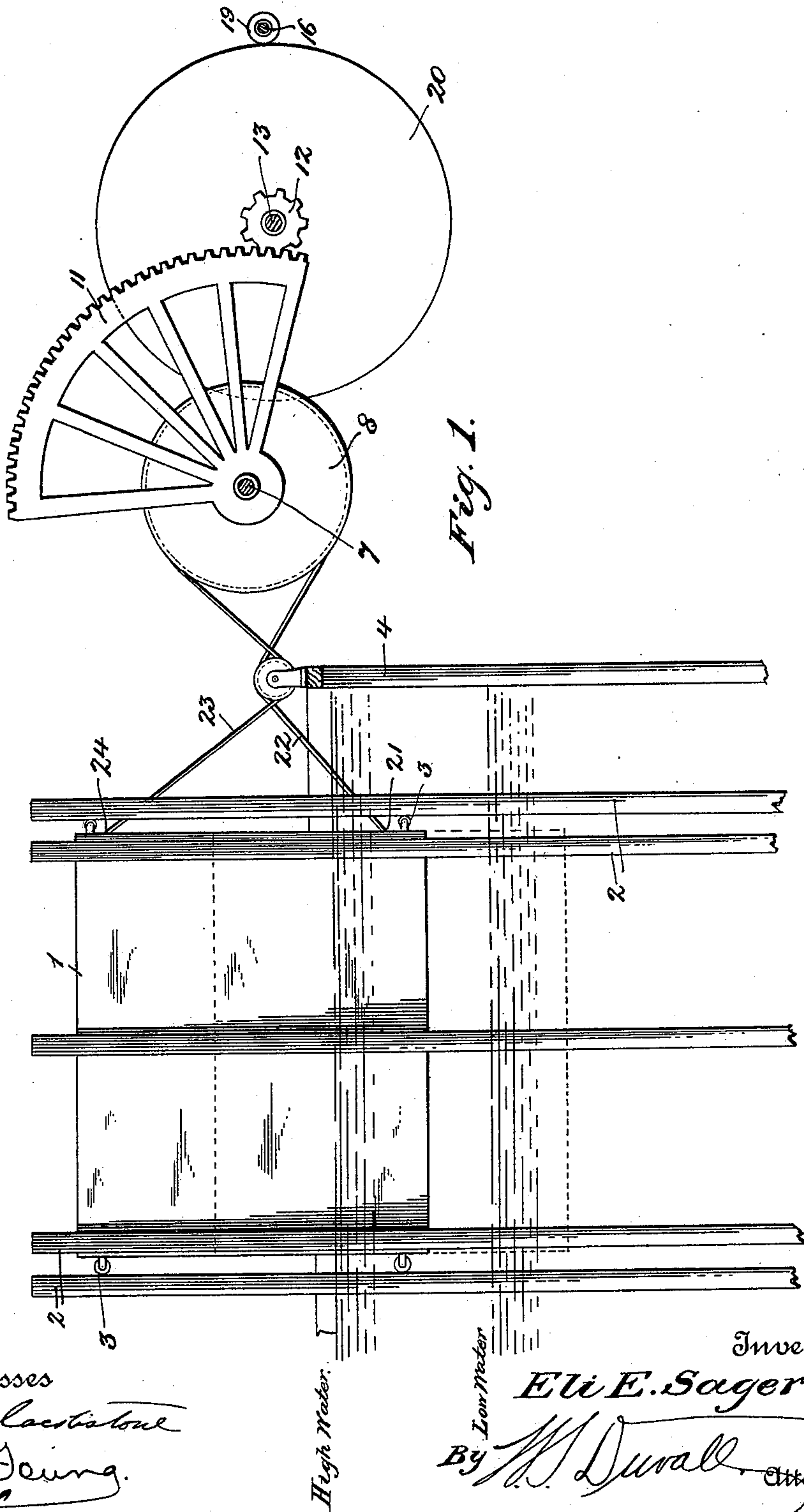
(No Model.)

2 Sheets—Sheet 1.

E. E. SAGER.
TIDE MOTOR.

No. 583,821.

Patented June 1, 1897.



Witnesses
F. D. Blackstone
O. D. Young.

Inventor
Eli E. Sager.
By M. D. Dural, Attorney

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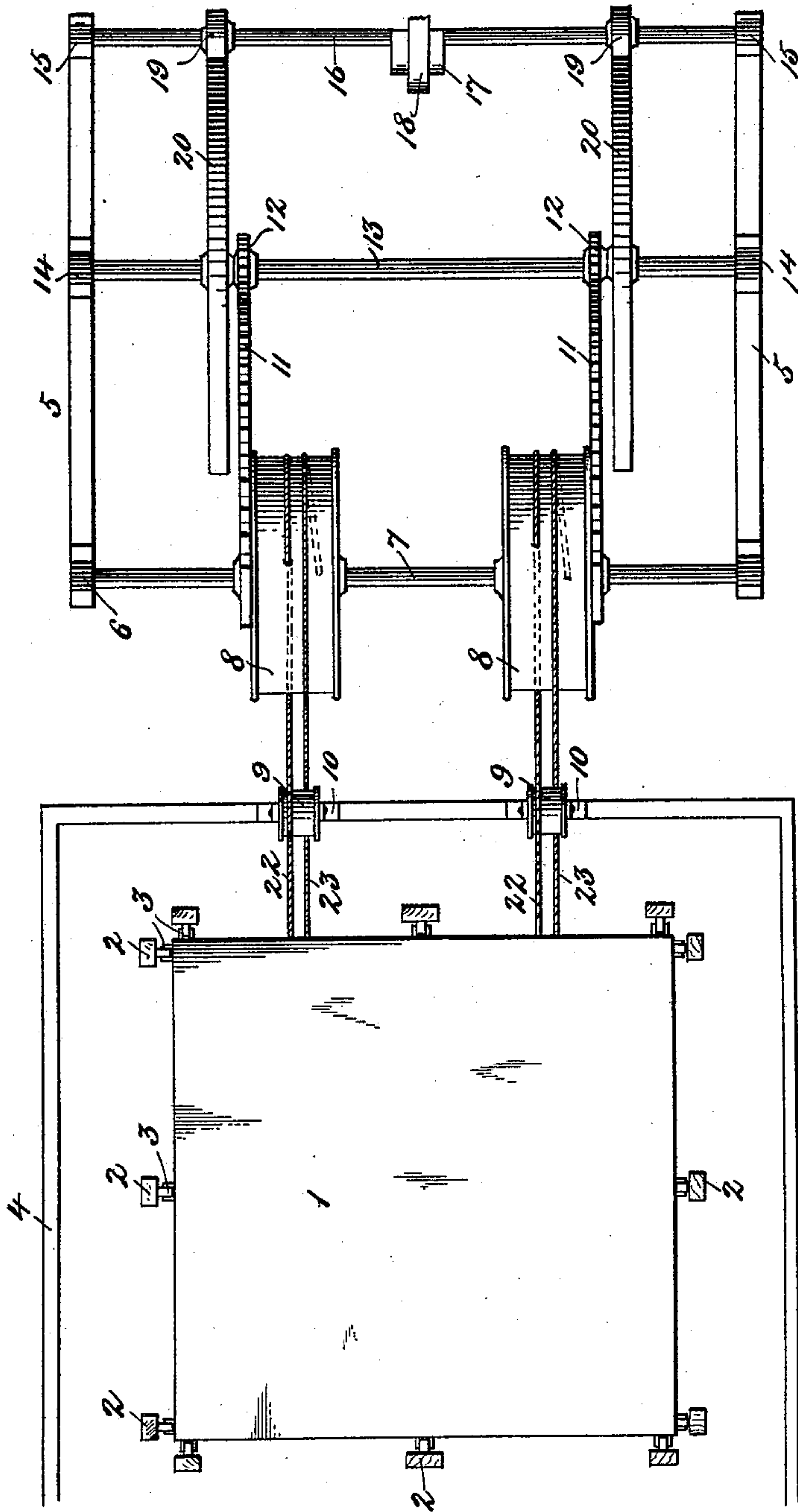


Fig. 2.

Witnesses
O. D. Young,
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Inventor:
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UNITED STATES PATENT OFFICE.

ELI E. SAGER, OF DULUTH, MINNESOTA, ASSIGNOR OF ONE-HALF TO PETER GILLEY, OF SAME PLACE.

TIDE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 583,821, dated June 1, 1897.

Application filed March 15, 1897. Serial No. 627,534. (No model.)

To all whom it may concern:

Be it known that I, ELI E. SAGER, a citizen of the United States, residing at Duluth, in the county of St. Louis and State of Minnesota, have invented certain new and useful Improvements in Tide-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in wave-motors or "tide-powers," as they are sometimes called.

The main objects of the invention are to produce a cheaply-constructed and desirable mechanism that may be located in a convenient body of water—as, for instance, a river or harbor—and which will be of such construction as will cause it to convert the rise and fall or ebb and flow of the tide into a power capable of being utilized and convey the same to any point desired for operating any kinds of machinery desired.

Various other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be particularly pointed out in the appended claims.

Referring to the drawings, Figure 1 is a side elevation and partial sectional view of a wave-motor or tide-power constructed in accordance with my invention. Fig. 2 is a top plan view of the same.

Like numerals of reference indicate like parts in both the figures of the drawings.

1 designates a float-body of any size or shape or construction, but which in the present instance is of cubical form, and is preferably constructed of wood suitably bound by iron. This float-body is supported for free vertical movement in a suitable guide-frame, which is preferably formed by arranging at each of the four sides thereof vertical posts or standards 2, the lower ends of which are submerged in the water of a river, bay, or ocean, as the case may be, the lower ends of the said posts or standards being driven in the bottom of the same a sufficient depth to lend perfect stability to the guide-frame which they compose. At such points of the float-body as are opposite the posts or standards 2 antifriction-rollers 3 may be located thereon, the same being adapted to ride over

the adjacent faces of the posts or standards 2 as the float-body is caused to rise and fall in a vertical manner by the ebb and flow of the tide, as will be obvious. I may, if desired, surround the structure thus formed by a wall or breakwater 4, such breakwater extending either wholly or partially around the same, the object being to protect the structure from the too violent action of the surf or waves and yet permit of the benefit of the resulting rise and fall of the water.

At the inner ends of a pair of parallel frames or other suitable supports 5, located at one side of, in this instance, and at a slight distance from the float-body 1, I journal in bearings 6 a main shaft 7, mounting rigidly upon the same either one or a pair of drums 8. One or a pair of corresponding, though smaller, drums or pulley-wheels 9 are located in bearings 10 in line with the drums 8, which bearings may be supported upon the breakwater 4, as herein shown, or upon an extension of the supporting side frames 5, where the breakwater is not employed, such employment being unnecessary in some instances.

Bolted or otherwise secured rigidly to a face of each of the drums 8, or at suitable points along the main shaft 7, are toothed sectors or segments 11 of substantially quadrant shape, the diameters of which are in excess of the diameters of the drums 8. The teeth of these sectors mesh with corresponding teeth of small spur-gears 12, which are rigidly mounted upon and are therefore adapted to move with a transverse counter-shaft 13, that alines with the main shaft 7 and is supported in bearings 14, located on the side frames 5.

Beyond and alining with the counter-shaft 13 there is supported in journals 15 a shaft 16, which may be centrally or otherwise cranked, as at 17, and provided at that point with a pitman-rod 18. If desired, several crank portions and pitman-rods may be employed in connection with the crank-shaft 16, or any other means may be employed for transmitting either a reciprocatory or rotary motion therefrom to any kind of mechanism located therebeyond. This crank-shaft 16 carries a pair of friction-pulleys 19, that move with the shaft, or they may be spur-gears, as pre-

ferred, and the same are in operative contact with similar, though much larger, pulleys or gears 20, that are mounted on the transverse counter-shaft 13 at the sides of the gears 12 thereon. In the present instance a pair of cables are attached at 21 to the opposite sides of the center and near the bottom of the float-body, such cables being designated as 22, and they are passed upward and over the pulleys 9 and extended along and under the large drums 8, terminating on the upper sides of the same, at which points they are made fast. Similar cables 23 are secured to the float-body near its top, extend downward from their points of fastening 24, pass under the pulleys 9 and over the large drums 8, terminating and being fastened to the latter at points about diametrically opposite those points where the cables 22 are fastened. It will be apparent that the vertical movements of the float-body resulting from the constant ebb and flow of the tide will by the cables 22 and 23 be transmitted to the large drums 8 and cause the same to rock or partially rotate in alternate directions. Such motion will be transmitted from the segments 11 to the small gears 12 and from them to the counter-shaft 13, the speed of the latter being increased by the difference in relative diameters existing between the segments and the gears. This rocking motion will then be transmitted to the large pulleys or gears 20 and from them to the smaller gears or pulleys 19, the speed of the latter and the crank-shaft upon which they are mounted being accordingly increased, as before. The pitman-rod 18 will thus be rapidly reciprocated and may be the end of a piston or may be connected to a fly or other form of drive-wheel. It will be obvious that these arrangements may be duplicated at each of the four sides of the float-body, although for the purpose of illustration I have deemed an illustration of one such arrangement sufficient for the purpose of explanation.

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

1. The combination with the vertical guides, and a float-body mounted for vertical movement therein, of a pulley located at one side of the float-body, a drum rotatably supported

in advance and in line therewith, cables connected to the float-body near the upper and lower ends thereof and passed in reverse directions about the pulley and beyond the same passed in reverse directions about and fastened to the drum, a toothed sector rocked by the drum, and a train of gearing operated by and connected to the sector, substantially as set forth.

2. The combination with vertical guides, and a float-body mounted for vertical movement therein, of a plurality of pulleys located at the side of the float-body, a corresponding number of drums supported for rocking and alining with the pulleys, pairs of cables connected to the upper and lower ends of the float-body and passed in reverse directions about the pulleys and beyond the same passed in reverse directions around and secured to the drums, a shaft for supporting the drums, and means for conveying motion therefrom, substantially as specified.

3. The combination with the series of guide posts or standards located as shown, the float-body, and the antifriction-rollers mounted on the latter and riding over the posts, of the breakwater, the bearings supported thereon, the pulleys journaled therein, the opposite side frames, the main shaft mounted in bearings thereon, the large drums carried by the main shaft, the pairs of cables connected to the upper and lower ends of the float-body and passed in reverse directions about the pulleys and beyond the same in reverse directions about and secured to the drums, toothed segments of greater diameters than the pulleys and drums mounted on the main shaft a transverse shaft journaled in the side frames, small gears carried thereby and meshing with the sectors, large gears carried by the transverse shaft, a crank-shaft journaled in bearings on the side frames, small gears carried thereby and driven by the gears of the transverse shaft, and a pitman-rod connected to the crank portion of the crank-shaft, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

ELI E. SAGER.

Witnesses:

GEO. L. SPANGLER,
WALLACE WARNER.