

No. 675,039.

Patented May 28, 1901.

J. J. GRAFF.
WAVE MOTOR.

(Application filed Dec. 7, 1900.)

(No Model.)

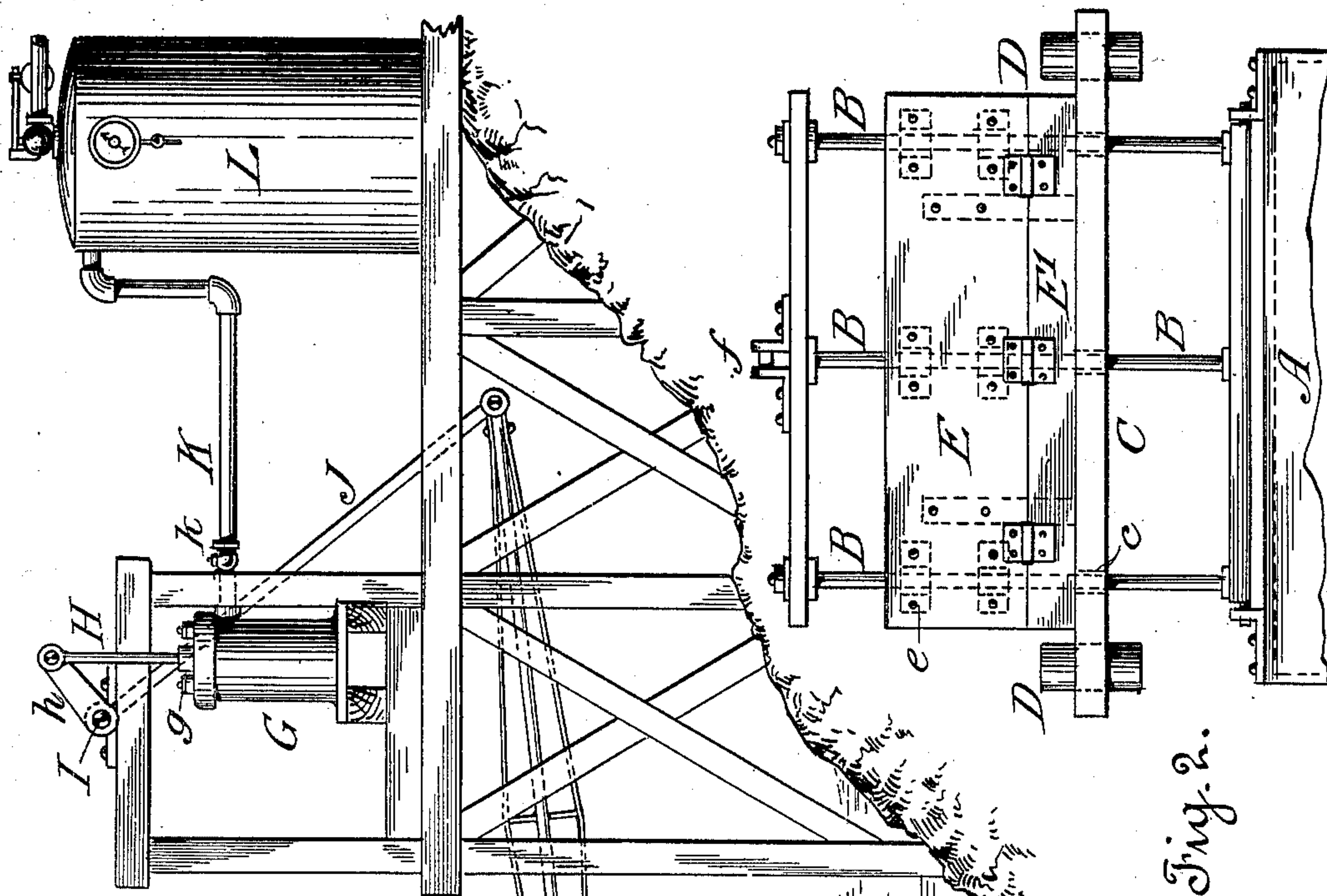


Fig. 1.

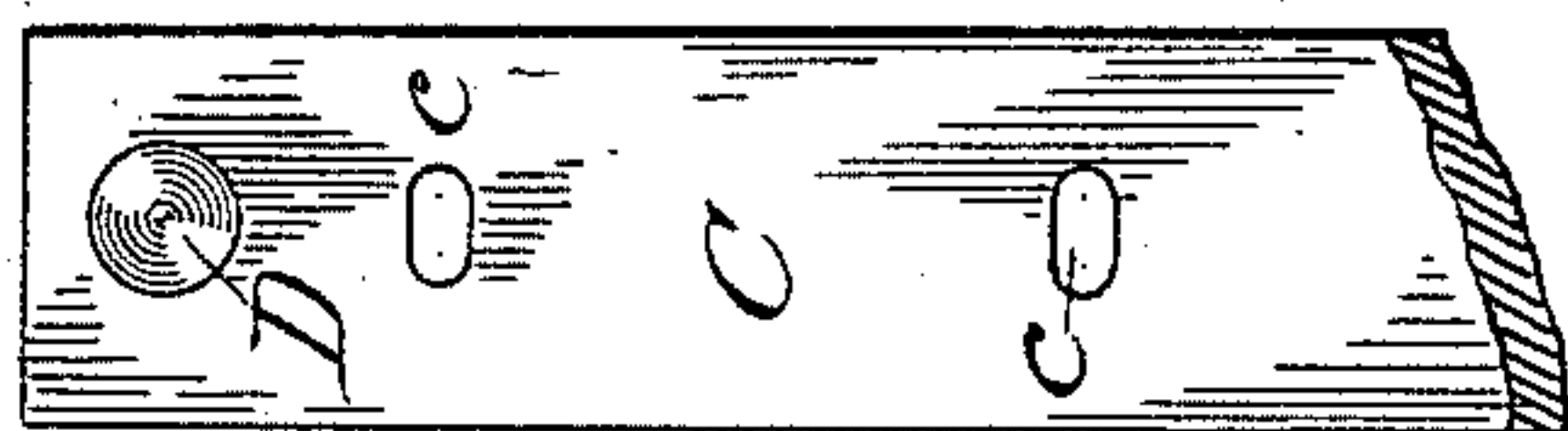


Fig. 2.

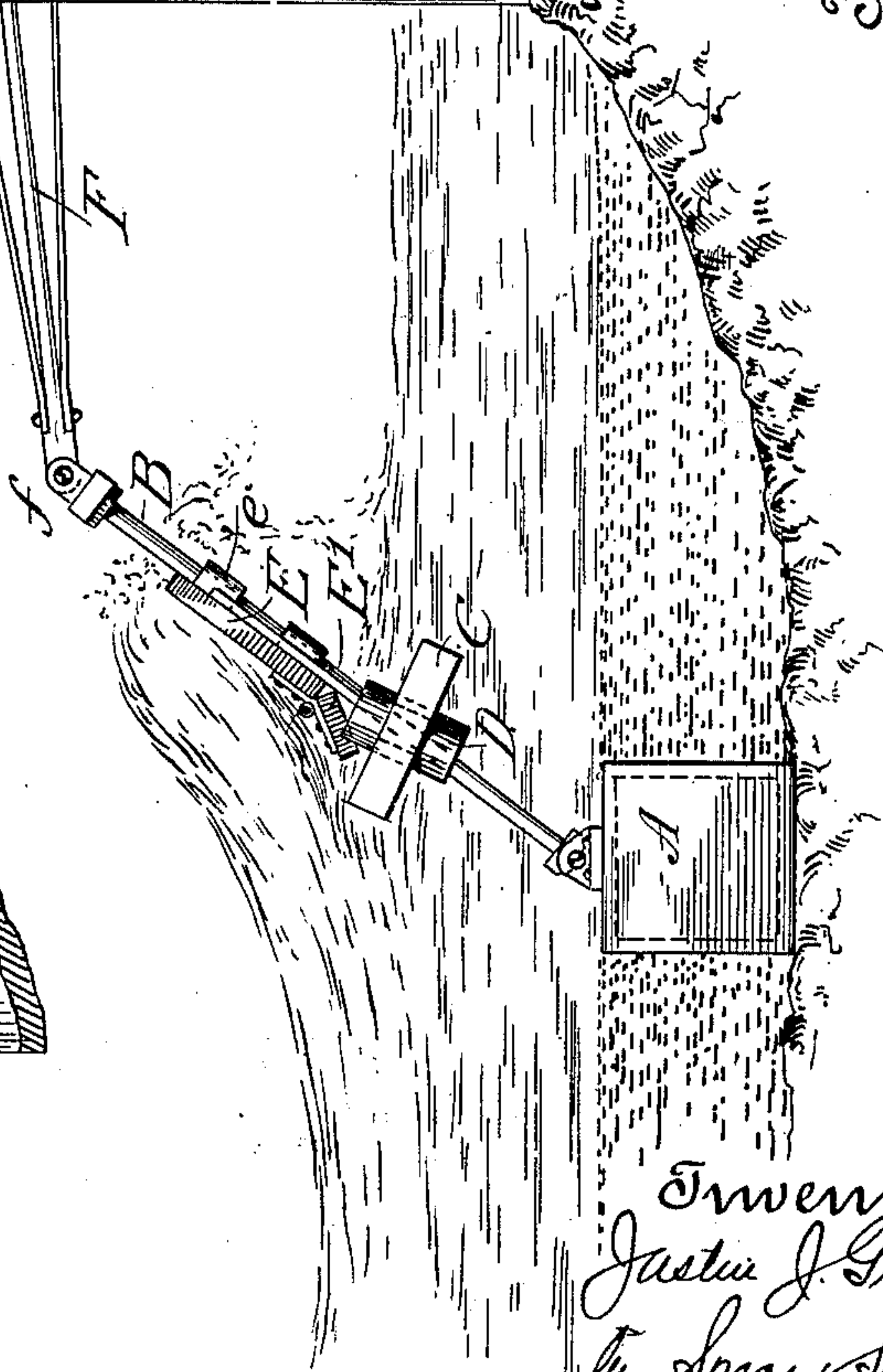


Fig. 3.

Witnesses.

H. Hartnerd.

F. W. Burt

Inventor.
Justus J. Graff
by *Spear & Seely*
Attorneys.

UNITED STATES PATENT OFFICE.

JUSTIN J. GRAFF, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF TWO-THIRDS TO JACQUES V. QUENTIN AND WALTER LEROUX, OF SAME PLACE.

WAVE-MOTOR.

SPECIFICATION forming part of Letters Patent No. 675,039, dated May 28, 1901.

Application filed December 7, 1900. Serial No. 39,082. (No model.)

To all whom it may concern:

Be it known that I, JUSTIN J. GRAFF, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Wave-Motors, of which the following is a specification.

My invention relates to wave-motors, and more particularly to the type in which the oncoming motion of wave or surf furnishes the motive power as distinguished from those in which a float is lifted vertically. I do employ a float, not to secure a lifting action, but to form a buoyant part of an oscillating device, which buoyant part is the resistance to the wave and is self-adjusting to the height of the latter by reason of its buoyancy.

My object is to furnish a simple and effective motor self-adjusting to tides and to an estimated range of wave heights.

I have embodied my invention in the accompanying drawings, in which—

Figure 1 is a side elevation of the motor with connections to a driven mechanism. Fig. 2 is an elevation of the motor. Fig. 3 is a plan view of the float.

At a suitable distance beyond low tide, and which depends upon the slope of the beach and the mean depth of water caused thereby, I anchor a strong foundation to support the motor. For moderate depths I employ a casing A, heavily weighted with concrete or other suitable material and embedded in the sand. If there is rock beneath a moderate depth of sand, the casing can be bolted thereto in addition. Instead of the casing, however, I can substitute a structure of piling, if the bottom is suitable, the only object being to obtain a strong foundation-support for the motor. Pivoted to this support is an oscillating frame comprising any number of parallel guide-rods B, of which three are shown, connected at the top and bottom, the journals or pivots being at the bottom.

Upon the frame is a self-adjusting buoyant float C, which may be hollow, so as to be buoyant in itself, or, preferably, which is rendered buoyant by air-tight boxes D. This is the simpler construction, as if a hollow box were employed it would be necessary to form air-tight passages surrounding the guide-rods B. With the construction shown the

float can be wholly loose on the rods (see Fig. 3) and has a free movement upon them, the rods passing through the elongated slots c. 55

Supported by the float is a vane E, which is also freely movable on the rods B, which pass through its guides e. This vane may be secured to the float; but I prefer to make it independent, so that it rests by simple gravity upon the float and will always be lifted by it. In a structure exposed to wave action it is better to avoid rigid connections between movable parts where practicable, so as to allow for some play and yielding between them. Practically, however, the float and vane are connected, and the lift of the float is always communicated to the vane above it. The vane E is preferably made in two parts hinged together. The second part is a feathering-shutter E', which hangs downward from the vane and is not connected to the guide-rods. The two combined offer a solid area of resistance to the oncoming wave, the shutter closing against the frame, so that the whole vane and the oscillating frame which supports it are forced forward to an inclined position, substantially as shown in Fig. 1. At such a position the forward impulse ceases and the water escapes forward over the top of the vane. If the vane has been forced down to still water, the shutter opens automatically and relieves any resistance. I prefer to attach stops e' to the vane, which when the shutter is open bear against the float, and thus prevent the vane from sliding down, so as to cause the float to obstruct the closing of the shutter. 85

A rod F is loosely connected to the top of the guide-frame at f and extends to any mechanism which is to be driven. I have shown an air-compressing cylinder G, whose piston-rod H is connected to a crank h on an oscillating shaft I. An arm J connects this shaft to the rod F. The cylinder G is shown with air-inlet valves g at the top, which open downwardly to admit air on the downstroke and close on the upward or compression stroke. The compression-stroke is caused by the forward or effective motion of the wave-motor, the return of the motor to its original position, which is substantially vertical, being made without resistance and is aided by the backflow of water. 100

More than one of such motors can be used arranged in a series, so as to be exposed successively to the action of the waves.

From the air-compressor a pipe K, having
5 a check-valve *k*, extends to an air-storage tank L.

Any other driven mechanism can be substituted for that shown, and connections can be provided for converting the oscillation of
10 the frame communicated through rod F into any other class of motion.

In case of heavy storms, which might endanger the motor, it is evident that the rod F can be disconnected from the top of the guide-
15 frame, which will permit the motor to swing forward and lie flat, so that the waves can pass over without doing any damage.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—
20

1. A wave-motor comprising a frame arranged in a substantially vertical position

and oscillating upon a fixed axis of oscillation at its bottom, exposed to the waves, and adapted to be connected to driven mechanism. 25

2. A wave-motor comprising an oscillating frame adapted to be connected to driven mechanism, and a buoyant float and vane movable upon said frame. 30

3. A wave-motor comprising an oscillating frame adapted to be connected to driven mechanism, a buoyant float guided loosely on said frame, a vane also movable on said frame, and a shutter hinged to said vane, and forming when closed a resistance to water and when open, a passage for it. 35

In testimony whereof I have affixed my signature, in presence of two witnesses, this 14th day of November, 1900.

JUSTIN J. GRAFF.

Witnesses:

L. W. SEELY,
F. W. BURT.