No. 868,547. PATENTED OCT. 15, 1907.

D. N. GREEN.

WAVE MOTOR.

APPLICATION FILED FEB. 11, 1907.

3 SHEETS—SHEET 1.

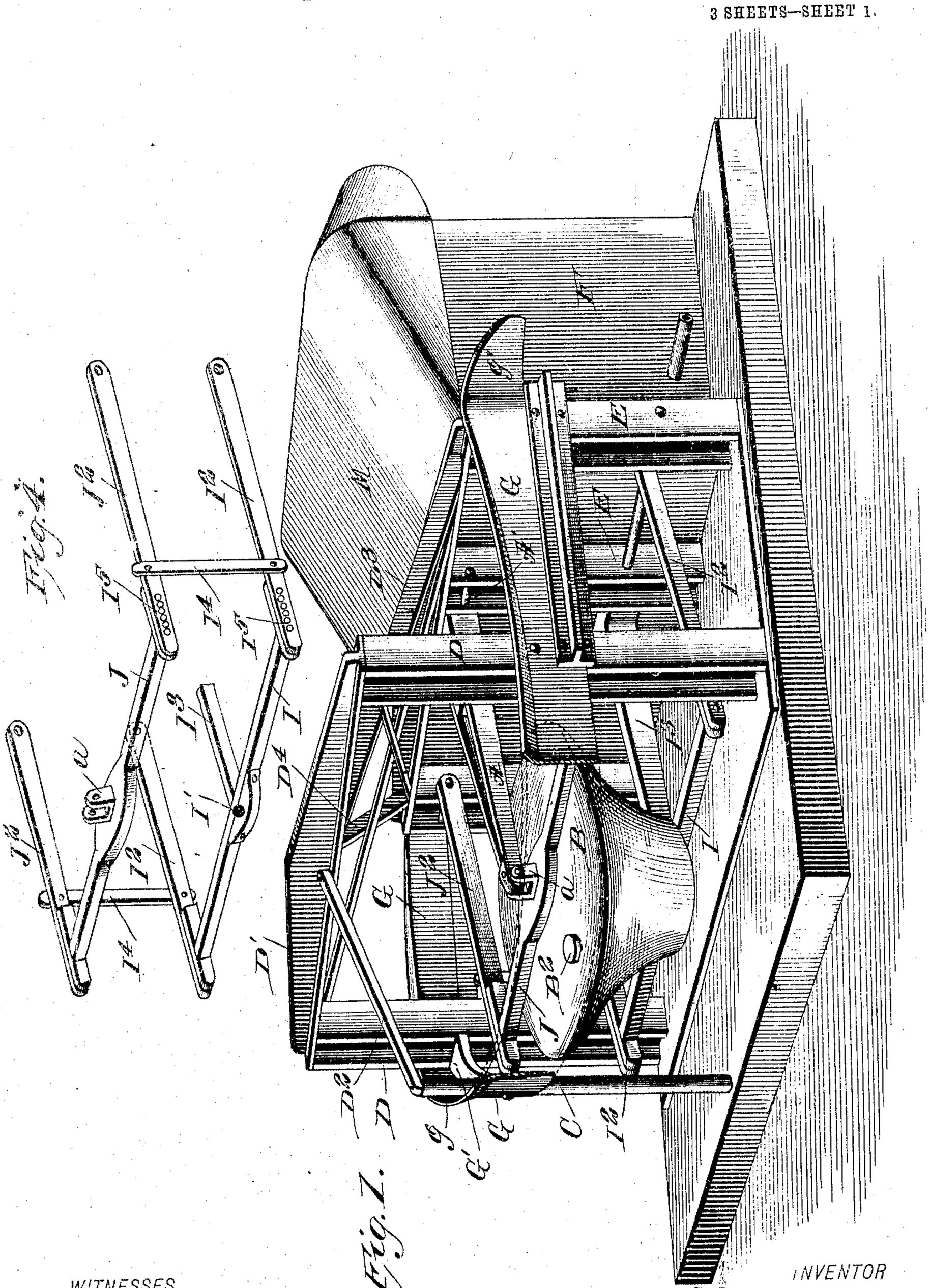

Fig. 1.

WITNESSES

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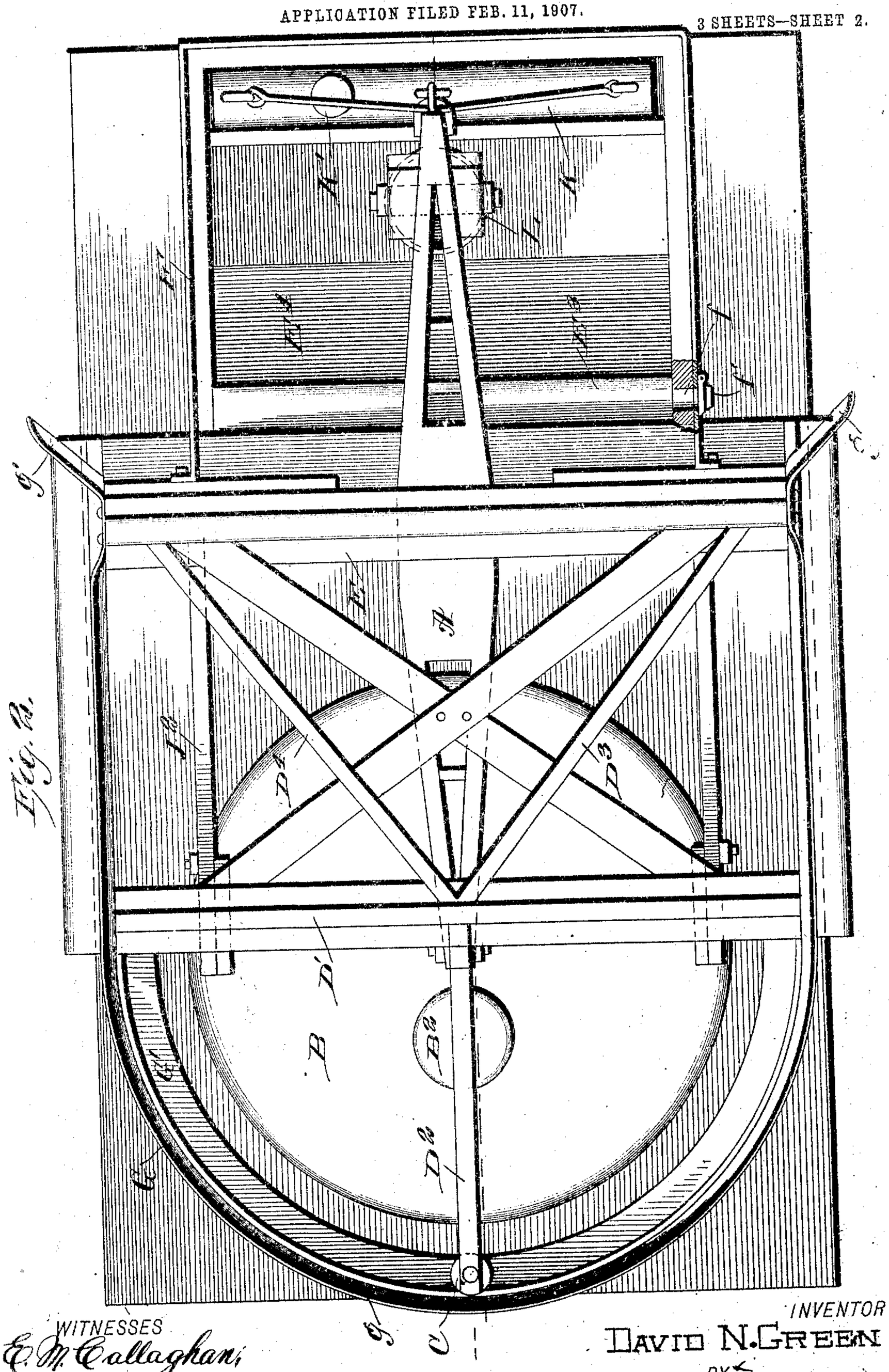

Fig. 2.

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3 SHEETS—SHEET 3.

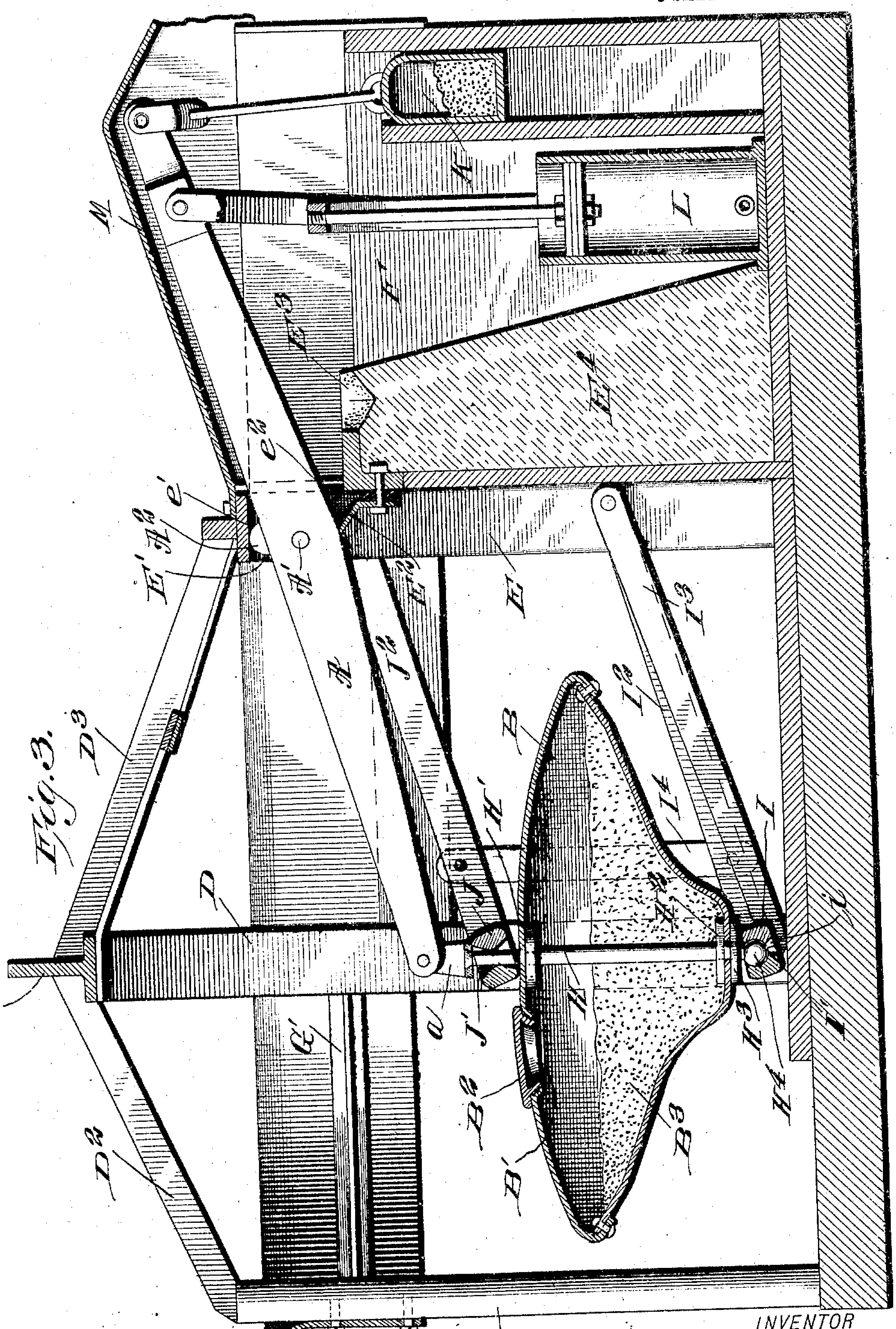

Fig. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

DAVID NEWTON GREEN, OF SUNBURY, OHIO.

WAVE-MOTOR.

No. 868,547. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed February 11, 1907. Serial No. 356,744.

To all whom it may concern:

Be it known that I, DAVID NEWTON GREEN, a citizen of the United States, and a resident of Sunbury, in the county of Delaware and State of Ohio, have invented an Improvement in Wave-Motors, of which the following is a specification.

My invention is an improvement in wave motors, and consists in certain novel constructions and combinations of parts as will be hereinafter described and claimed.

In the drawings, Figure 1 is a perspective view, and Fig. 2 a top plan view of an apparatus embodying my invention, the cover for the pump chamber being shown in place in Fig. 1 and removed in Fig. 2. Fig. 3 is a vertical longitudinal section of the apparatus, the cover being applied; and Fig. 4 is a detail view illustrating the swinging frame employed in connection with the float.

In carrying out my invention, I provide a beam A pivoted between its ends and extending at its forward end into a housing frame which incloses the float B and comprises a central front post C, side posts D, a top cross beam D′ extending between the posts D, a bar D² extending between the front post C and the middle of the top bar D′, and bars D³ and D⁴ extending between the top bar D′ and the upper end of the intermediate frame E which is arranged between the housing frame and the chamber or compartment F in which the pump and counter-balancing weight are located.

The housing frame and the intermediate frame E may be made of structural iron, and a fender G which may be of boiler iron or the like, extends in a curve around the front side of the housing frame, being reinforced by ribs G′ as shown, slightly deflected at its upper edge *g*, and has its ends *g′* turned outwardly as shown in Fig. 2. The purpose of this fender is to break the force of and to deflect any waves that may come at a great height.

The beam A is pivoted at A′ in an opening E′ in the intermediate frame, and has on its upper side a boss or projection A² which riding against the upper wall *e′* of the opening E′, forms a closure above the beam, and a plate E² supported on the frame E below the beam, holds a rubber block *e²* in contact with the beam to prevent water from passing through the opening E′ below the beam as the latter rocks. This construction tends to prevent the passage of water freely into the chamber F, but should any water pass through the opening E′ in spite of the precautions described, it will enter a laterally extending gutter E³ in the cement abutment E⁴ and discharge at the side of the chamber F through an opening *f*, an outwardly opening check valve *f′* being provided to permit the water to discharge from the gutter E³, as will be understood from Fig. 2 of the drawing.

The float B operates within the housing frame, and is preferably made circular in horizontal section, as will be understood from Fig. 2, and tapers on its under side toward its lower end. This float may be made of boiler iron, and has a man-hole B′ closed by a suitable cap B² through which sand B³ may be supplied in any suitable quantities to the float in order to insure the desired weight to cause the float to follow the waves down quickly in the operation of the apparatus.

The float is provided with a central shaft H, extending above and below the float and having collars H′ H² and H³. The collar H′ is within the float and immediately below the top wall thereof, while the collars H² and H³ are respectively above and below the bottom wall of the float. This is best shown in Fig. 3, and the described construction tends to hold the shaft in firm connection with the float. The lower extension of the shaft H is provided with a ball H⁴ which operates in a socket I′ supported on a lower cross bar I extending below the float. The upper extension projects upwardly through an opening J′ in a top cross bar J extending above the float, and at its upper end the shaft H is connected preferably by a stirrup *a* with the front end of the beam A. The upper and lower cross bars J and I, and the bars J², I² and I³, form what for convenience of reference I term a swinging frame connected at one end with the intermediate frame E, and at its other end with the float in such manner as to steady the operation of the float in the use of the invention.

The bars I² and J² it will be noticed extend at the sides of the housing frame while the bar I³ is located midway between the sides of the said frame and below the front arm of the rocking beam A. I prefer to connect the bars I² and J² near their swinging ends by the side links I⁴ extending on opposite sides of the float and on their outer sides near their swinging ends, the bars I² and J² are provided with antifriction devices which may be in the form of balls I⁵ as shown and which operate against the inner faces of the side posts D and ease the operation of the apparatus as the float rises and falls under the influence of waves approaching at an angle.

From the construction shown it will be noticed that the float is supported so it may turn freely on a vertical axis to which end the projecting or extending ends of its shaft H form trunnions, the lower one turning in the ball socket and the upper one turning in its swivel connection with the stirrup *a* as best shown in Fig. 3. This construction permits the float to turn freely and avoids any straining action that might result from a rigid connection of the float with the beam and the swinging frame having the side bars connected with the upper and lower sides of the float as before described.

In rear of the intermediate frame E I provide the chamber F having the water-tight front wall E⁴. In this chamber I provide the counterbalancing weight K,

connected with the rear end of the beam A and operating to steady the motion of the beam and to aid the wave action in raising the float in the operation of the apparatus. This weight K is preferably in the form of a strong box of boiler iron or the like, which may be filled with sand or other suitable weight supplied through a handhold K′ so it may be adjusted or varied as desired. I also provide a pump L which may be of any suitable form adapted for pumping either air or water and connected with the rear arm of the beam A, so it will be operated thereby in a manner well understood by those skilled in the art.

In operation the apparatus is to be rigidly anchored in any suitable manner on either a sand or rock shore, sufficiently far out into the water to secure the desired operation of the waves upon the float and when so anchored, the float will be caused to rise and fall under the influence of the waves, being balanced in a measure by the counterbalancing weight K, which is directly applied to the beam and the beam is also arranged to directly operate the pump as before described.

As best shown in Figs. 1 and 3, a cover or roof M is provided over the pump chamber to prevent the waves from dashing therein when the water is high.

An opening *i* is provided leading from the socket I′ to permit the escape of any sand that may get in the socket.

It will be noticed that the fender G, as before suggested, is designed to break and deflect any waves that come at a great height. This deflector also operates to reinforce and strengthen the whole housing frame, said fender extending from one side of the intermediate frame to the other side around the front of the housing frame and being reinforced by ribs G′.

The chamber F for the counterbalancing weight K and the pump L is water-tight at the bottom and on all four sides.

The float B is designed to receive waves from three points, that is to say, from the front and both sides, and when the waves are very high and raise the float to its extreme height, the counterbalancing weight will rest on the bottom of the chamber F, and the float being heavier than water, will not be inclined to rise any higher, all unnecessary strain being thereby taken from the walking beam, the intermediate frame and the pump.

I claim—

1. A wave motor comprising a housing frame having side posts, a front post, connections between the upper ends of said post and a fender extending around the outer side of the housing frame near its upper end, an intermediate frame to which said fender is secured, a top beam extending between the upper ends of the side posts, bars connecting said top beam with the intermediate frame, a pump chamber in rear of the intermediate frame, a beam pivoted midway between its ends to the intermediate frame and having its front arm extending in the housing frame, a float circular in plan and tapering toward its lower end and provided with upper and lower shaft extensions or trunnions, a stirrup connecting the upper trunnion with the beam and swiveled to the said trunnion, a top cross bar extending below the stirrup and having an opening receiving the upper shaft extension, side bars secured at one end to the said top bar and pivoted at their other ends to the intermediate frame, the said lower shaft extension having a ball, a lower cross bar having a socket receiving said ball, side and intermediate bars secured at one end to the lower cross bar and pivoted at their other ends to the intermediate frame, antifriction devices on the outer sides of the upper and lower side bars and adapted to operate against the inner faces of the side posts of the housing frame, a counterbalancing weight connected with the rear arm of the beam and a pump and devices for operating the pump from the rear arm of the beam, substantially as and for the purposes set forth.

2. A wave motor comprising a pivoted beam, a float circular in cross section, devices connecting the float with the beam, whereby the float may turn freely on a vertical axis, and means for guiding and bracing the float in its ascending and descending movements, substantially as set forth.

3. The combination in a wave motor, of a rocking beam, a float suspended therefrom and a swinging frame having bars above and below the float for bracing and guiding the same in its ascending and descending movements, substantially as set forth.

4. The combination in a wave motor, of a rocking beam, a float suspended therefrom and a swinging frame inclosing said float and having cross bars above and below the same and swinging side bars connected with said cross bars substantially as set forth.

5. A wave motor comprising a float adapted to turn freely on a vertical axis, means connected with said float for operation thereby, and guiding and bracing devices extending above and below the float, substantially as set forth.

6. A wave motor having a housing frame for a float, a pump chamber in rear of said frame and an intermediate frame between the housing frame and the pump chamber, a beam pivoted to the intermediate frame and having its front arm extending within the housing frame and its rear arm extending within the pump chamber, a float within the housing frame and connected with the front arm of the beam, a swinging frame having upper and lower portions extending above and below the float, and means within the pump chamber for operation by the beam, substantially as set forth.

7. The combination in a wave motor, of a float, shaft extensions or trunnions above and below the float, a cross bar extending below the float and having a ball and socket connection with the lower shaft extension, a cross bar above the float and having an opening through which the upper shaft extension passes, devices above the said cross bar and connected with the upper shaft extension for operation by the float and swinging side bars connected with said upper and lower cross bars, substantially as set forth.

8. The combination in a wave motor, of a float, upright posts on opposite sides of the float, swinging side bars pivoted at one end and extending at their other ends above and below the float and operating at their outer faces adjacent to the inner faces of the upright posts, antifriction devices between said swinging side bars and the posts, cross bars connected with the side bars and extending above and below the float and devices for operation by the said float, substantially as set forth.

9. A wave motor comprising a float, a housing frame inclosing the float, a pump chamber, an intermediate frame between the pump chamber and the housing frame and provided with an opening for a rocking beam, a beam pivoted to the intermediate frame and having a front arm connected with the float and a rear arm extending into the pump chamber and a pump in said chamber and connected with the beam, substantially as set forth.

10. A wave motor comprising a beam pivoted between its ends, a float operating upon one end of the beam and a counterbalancing weight operating directly upon the other end of the beam, and means connected with the beam for operation thereby, substantially as set forth.

DAVID NEWTON GREEN.

Witnesses:
EDWARD CULVER,
R. M. VAN METER.