

(No Model.)

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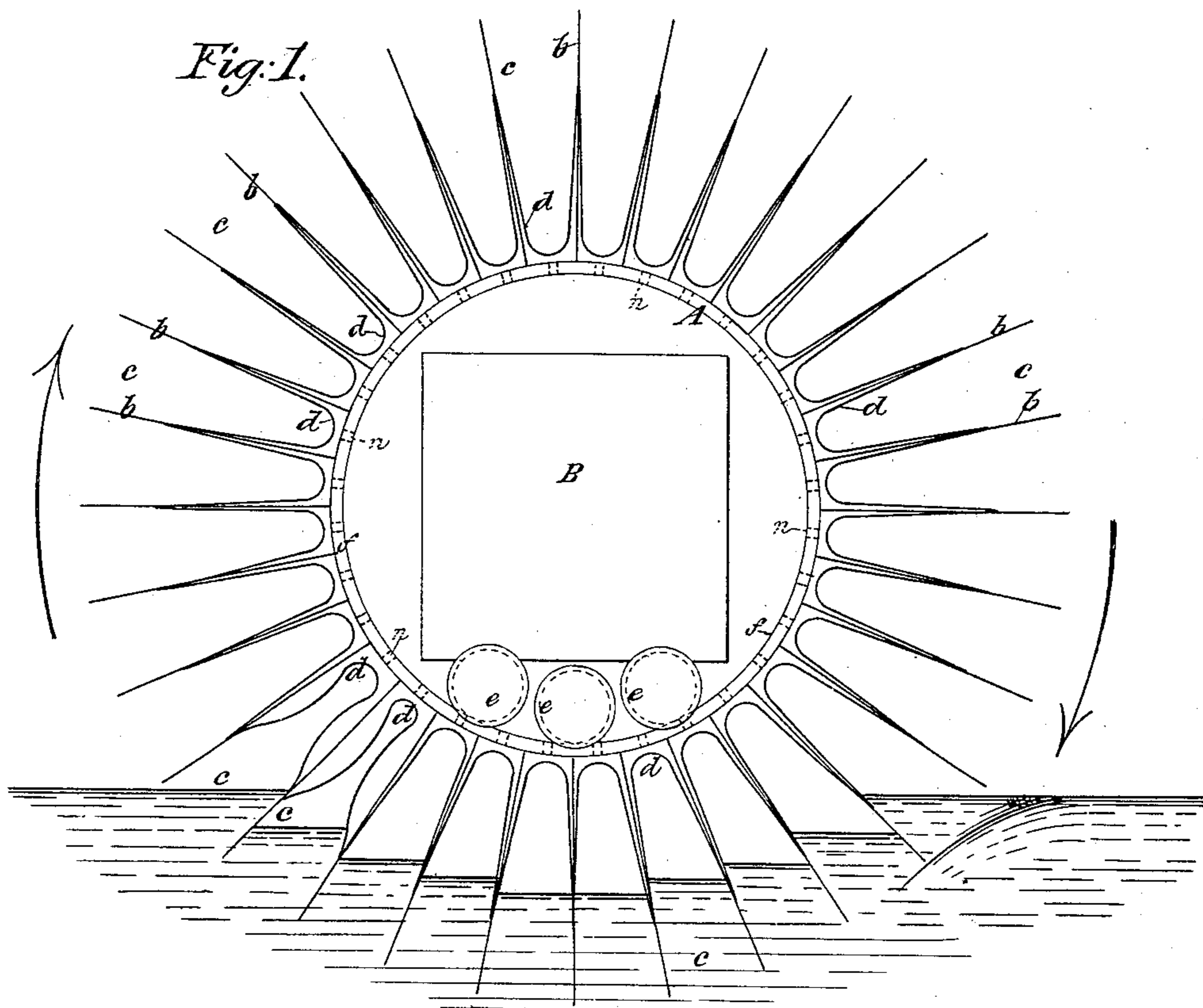
O. VANDENBURGH.

BUOYANT PROPELLER.

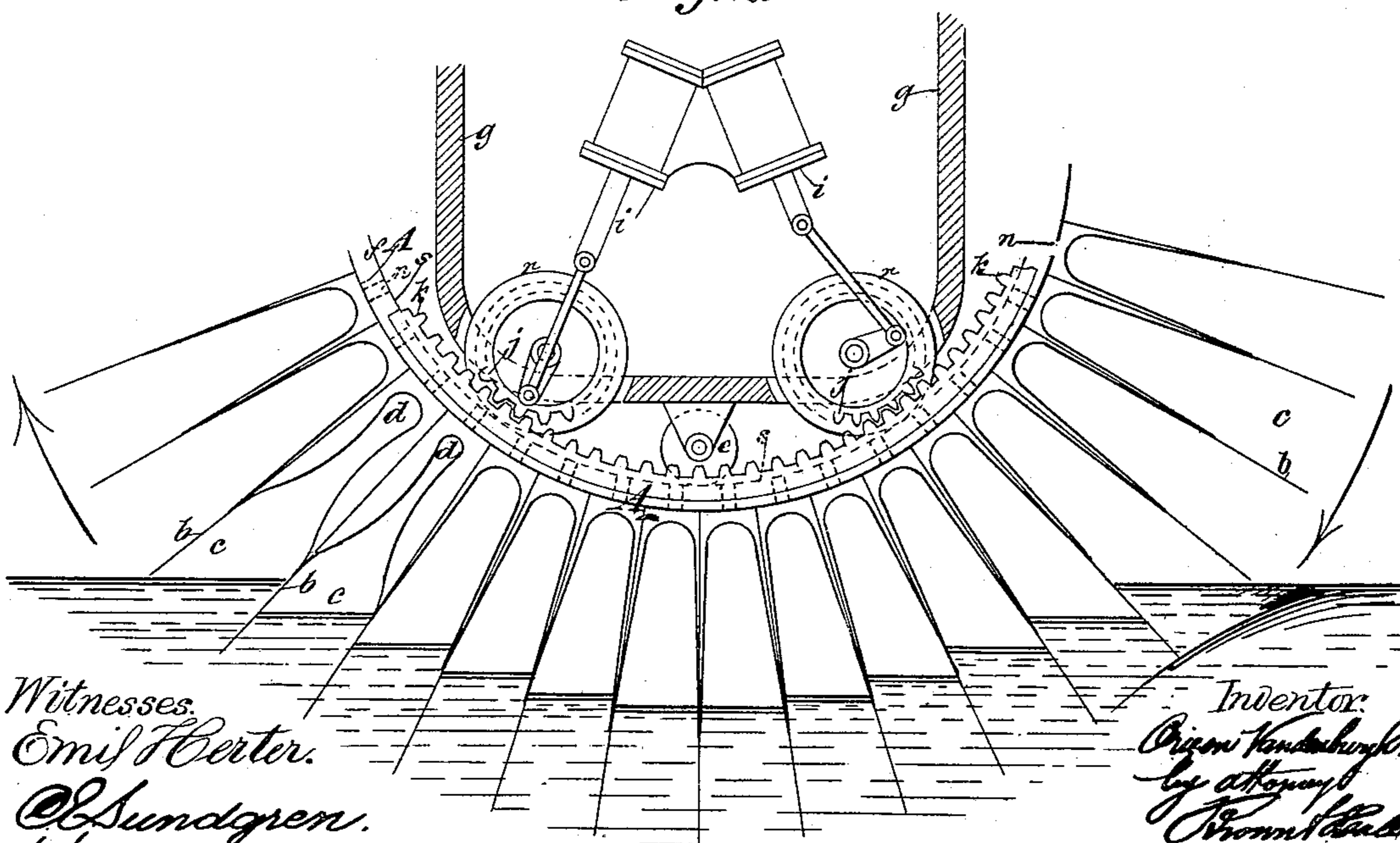
No. 377,181.

Patented Jan. 31, 1888.

*Fig. 1.*



*Fig. 2.*



Witnesses:  
Emil Herter.  
O. Sundgren.

Inventor:  
O. Vandenburg.  
by Attorney  
Thomson & Co.

(No Model.)

2 Sheets—Sheet 2.

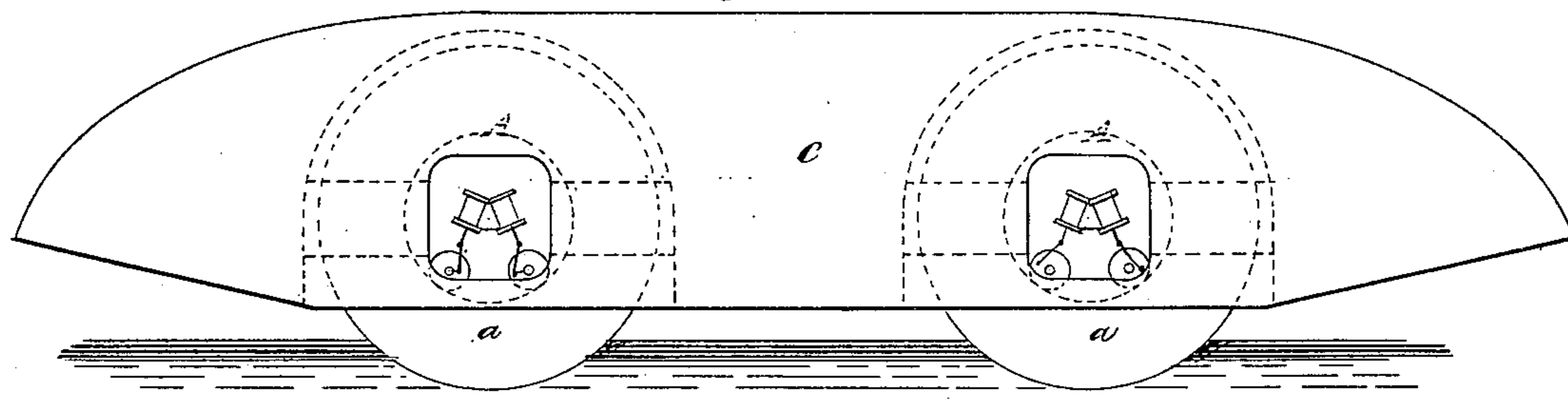
O. VANDENBURGH.

BUOYANT PROPELLER.

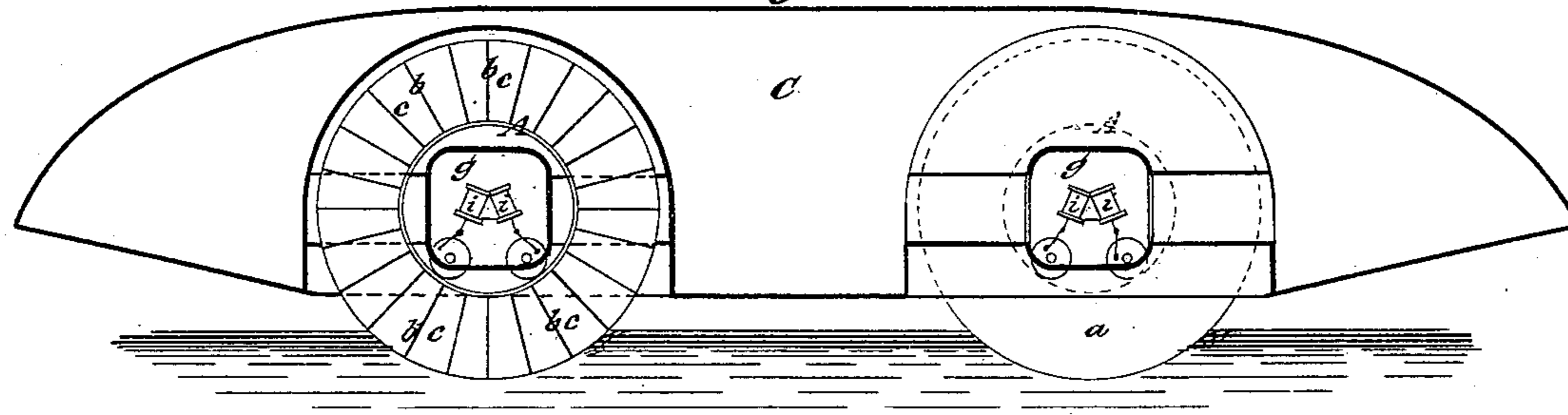
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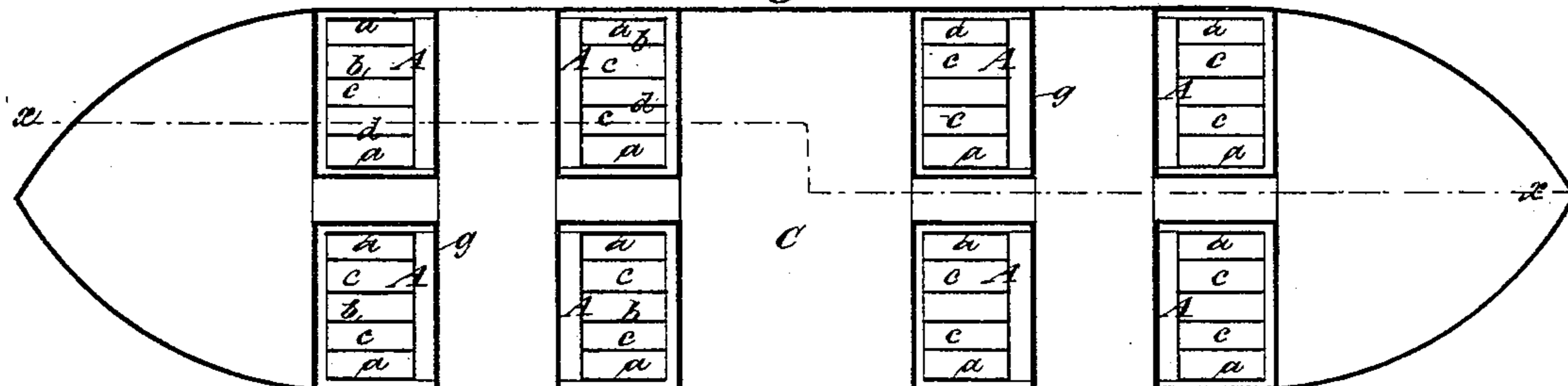
*Fig. 3.*



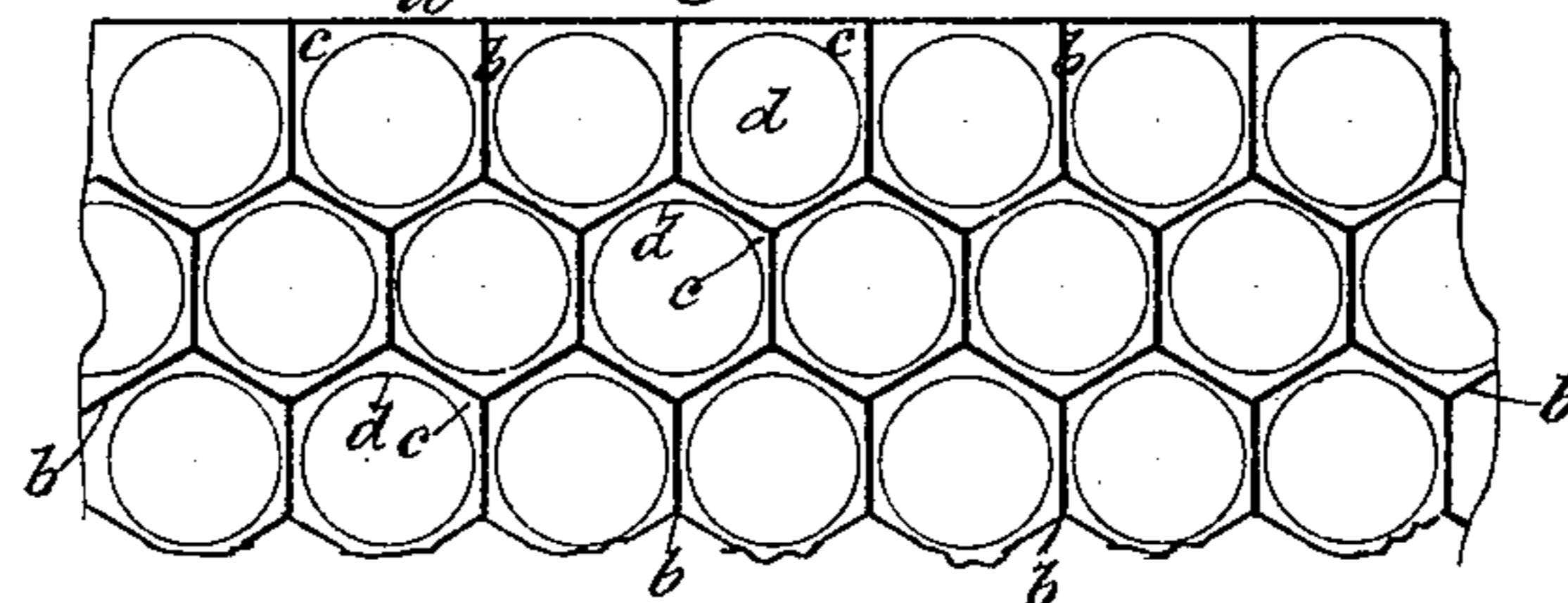
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



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By attorney  
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# UNITED STATES PATENT OFFICE.

ORIGEN VANDENBURGH, OF NEW YORK, N. Y.

## BUOYANT PROPELLER.

SPECIFICATION forming part of Letters Patent No. 377,181, dated January 31, 1888.

Application filed March 28, 1887. Serial No. 232,664. (No model.)

*To all whom it may concern:*

Be it known that I, ORIGEN VANDENBURGH, a citizen of the United States, residing in the city, county, and State of New York, have  
5 invented a new and useful Improvement in Buoyant Propellers, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to that class of propelling-wheels known as "buoyant" propellers, which consist of cylinders having their peripheries composed of or surrounded by circular series of air-chambers which are open at those sides or ends which are presented  
15 peripherically outward, and in which, when the said sides or ends are submerged, there is confined a certain quantity of air, through which the propeller itself and the superincumbent weight of the vessel borne by it are directly  
20 supported upon the water.

My improvement consists, essentially, in the self-collapsible construction of the said air-chambers, whereby I obviate the resistance to the withdrawal of the said air-chambers from the water as the said cylinders or  
25 wheels rotate, which might otherwise result from the formation of a partial vacuum in said chambers.

In the accompanying drawings, Figure 1  
30 represents a vertical section parallel with the planes of rotation of a supporting and propelling wheel constructed according to my invention. Fig. 2 represents a similar view of a portion of such a wheel with means of giving rotary motion to the same. Fig. 3 is a side  
35 view of a steam-vessel supported and propelled by wheels or cylinders constructed according to my invention. Fig. 4 represents a longitudinal section of the same in the line  $x$  of Fig. 5, which represents a horizontal section of the same. Fig. 6 is a diagram of a  
40 portion of the periphery of one of the supporting wheels or cylinders, illustrating a system on which the air-chambers may be constructed and arranged.

Similar letters of reference indicate corresponding parts in the several figures.

The supporting and propelling wheels or cylinders consist each of a cylinder or drum,  
50 A, having flanges  $a a$  at each end, and having the space between said flanges divided by partitions  $b b$ , arranged in any suitable man-

ner--as, for instance, in squares, hexagons, or parallelograms--to form air-chambers  $c c$ , which are open at the outer periphery of the structure. In each of these chambers  $c$  there  
55 is fitted a bag,  $d$ , (see Figs. 1, 2, and 6,) made of india-rubber or of cloth coated or saturated with any suitable water-proof material, or made of any other strong water-proof and  
60 flexible fabric, the mouth of the said bag opening toward the mouth of the chamber and being secured closely to and around the walls of the chamber by any suitable means. These bags form the inner ends and portions  
65 of the sides of the chambers, which are flexible, and are exposed to the atmosphere through suitable openings in the cylinder A, as shown at  $n n$  in Figs. 1 and 2.

The hull or portion of the vessel which is  
70 to contain crew, cargo, passengers, and stores may be variously constructed and supported on the wheels or cylinders (one or more) thus constructed.

In Fig. 1 the hull is represented as consisting of a structure, B, placed entirely within  
75 the cylinder A, wherein it is supported on wheels or rollers  $e e$  on annular tracks  $f f$ , the said structure being kept upright by a proper disposition of its weight.

In Figs. 3, 4, 5 the hull consists of a carriage, C, supported above the surface of the water on four cylinders or wheels A, having air-chambered peripheries like that shown in Fig. 1, the support being given by means of trunks or tubular bearers  $g g$ , passing transversely through  
85 the said hull or carriage and firmly connected with the sides thereof, the said trunks constituting axles to the supporting and propelling cylinders and wheels, and being fitted with  
90 bearing-wheels  $h h$ , to bear on annular tracks provided in the cylinders A. These trunks may also constitute engine-rooms containing engines  $i i$ , for producing the rotary motion of the cylinders or wheels for propelling the vessel, the engines, as shown in Fig. 2, being  
95 geared by cog-wheels  $j j$  with circular racks  $k$  within the cylinders, or being furnished with smooth wheels  $r r$ , running on tracks  $s s$  within the cylinders for the purpose of driving the same, the said engine-rooms being reached by passages  $l$  from the portions of the hull between the wheels or cylinders.

The vessel or hull structure supported on

the so-constructed wheels or cylinders and the said wheels themselves are all supported in the water through the medium of the air contained in the air-chambers *c-c*, whose mouths  
 5 are submerged, the air being compressed in the said chambers as the latter become submerged after their mouths enter the water during rotation, and the compression being increased until the said chambers arrive directly  
 10 under the axis of the wheel or cylinder, after which the air expands until the chambers leave or are just about to leave the water, when the bags *d* will, owing to the pressure of the atmosphere on their exteriors, be free to partly  
 15 collapse, as shown at the left hand of Fig. 1, in which the direction of rotation is indicated by an arrow, and in this way the said bags prevent any resistance to the withdrawal of the chambers from the water that might otherwise result from the formation of a partial  
 20 vacuum within them, owing to the escape of a portion of the air as they entered the water.

In order to keep the bags *d* distended at all times but when their collapsion is required to  
 25 take place, and then to permit them to collapse freely, the said bags may be strengthened by hoops, coils, bows, or thin ribs of steel or other elastic and flexible metal or material, thus adding elasticity to the flexible portions  
 30 of the chambers and assisting in the expansion of said portions after leaving the water.

There are three properties of the liquid surface of the earth which I believe that I successfully utilize in my invention by the rotary  
 35 motion and rolling contact of the air-chambered propelling and supporting cylinders or wheels. These are as follows:

First. The resistance of water to being moved or displaced increases in a higher ratio than  
 40 the velocity of the attacking body. This resistance is never less than as the square of that velocity, and is greatest when the pressure is downward. By my invention this law of resistance is made to operate beneficially to sustain and propel the vessel over the whole surface of contact, while by the present system of  
 45 steam-propulsion this law operates beneficially only against the relatively small area of contact of the paddle and screw and injuriously  
 50 and as a resistance against the very large area of contact of the hull of the vessel.

Second. The very slight cohesion between the particles of water permits of its very easy penetration by a thin solid which causes no  
 55 substantive displacement. In the operation of my invention the only contact is the dropping

down into and raising up out of the water of the thin blades or sheets of metal, wood, or other substance constituting the partitions between and inclosing the air-chambers, with  
 60 very little horizontal motion during contact. With this operation and the refusal of air and water to mix when in contact and under pressure, there results a condition far more favorable for rapid water transportation than has  
 65 heretofore been obtained—that is, sustaining the vehicle and its load on an elastic cushion of atmospheric air substantially free from contact with the earth—a condition whereby resistance from impact, as well as nearly all the  
 70 other resistance which now comes from the immersion and resulting motion in contact with the water of the ordinary ship or vessel, disappears. Then as the air-chambers by their rotation successively come down in contact they  
 75 are closed by the water, and the air within them is compressed by the weight of the cylinder or wheel and its load. The chambers by their rotation pass aft and rise out of the water, and as they rise the expansion and upward pressure of this compressed air operate  
 80 as a propelling force, giving back for this useful purpose nearly the equivalent energy which was for the moment lost by the resistance and compression in front. Finally, the flexible and  
 85 elastic bags which constitute the upper and inner portions of the air-chambers, by being capable of collapsion when the pressure within the air-chamber is less than the normal pressure of the atmosphere, insure the air-chambers  
 90 leaving the water with a very slight or merely nominal resistance.

Third. The unlimited room for a cylinder or wheel both in diameter and width to roll on the liquid surface compared with the limited  
 95 space within which the dimensions of a wheel for land-vehicles is confined.

What I claim as my invention, and desire to secure by Letters Patent, is—

The buoyant propeller consisting of a cylinder having its periphery composed of or surrounded by self-collapsible open-mouthed air-chambers which receive within them the air through which the propeller itself and the  
 100 superincumbent weight of the vessel are supported directly upon the water, substantially as herein described.

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Witnesses:

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 HENRY J. MCBRIDE.